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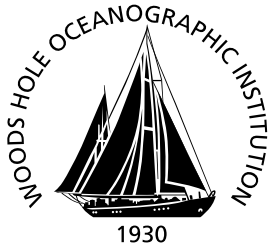

Can Humans & Coastal Landforms Co-exist?: Proceedings of a Workshop held at the Woods Hole Oceanographic Institution, Woods Hole, MA January 24, 2001

edited by

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Woods Hole, MA 02543

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Technical Report

Sea Grant
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Funding was provided by SeaGrant at Woods Hole Oceanographic Institution.

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Approved for Distribution:

Judith C. McDowell

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Director, Woods Hole Oceanographic Institution Sea Grant Program

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- Jim O'Connell, Workshop Planning Committee Chair, WHOI Sea Grant and Cape Cod Cooperative Extension
- Leslie Fields, Woods Hole Group
- Rob Gatewood, Town of Barnstable, Conservation Administrator
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- Truman Henson, Massachusetts Coastal Zone Management
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Table of Contents

Abstract

The primary objective of this publication is to share with a wider audience the valuable information and extensive dialogue that took place amongst over 140 individuals who attended the second in a series of planned workshops on the science and management of coastal landforms in Massachusetts. This workshop took place at the Woods Hole Oceanographic Institution on January 24, 2001. The individuals who attended this workshop are actively engaged in planning, managing, regulating, engineering, educating, and studying coastal landforms and their beneficial functions. This workshop titled, *Can Humans & Coastal Landforms Co-exist?*', was a natural follow-up to a previous workshop, *Coastal Landform Management in Massachusetts*, held at WHOI October 9-10, 1997 (proceedings published as WHOI Technical Report #WHOI-98-16).

The workshop had a very practical, applied focus, providing state-of-the-art scientific understanding of coastal landform function, case history management and regulation of human activities proposed on coastal landforms, a multi-faceted mock conservation commission hearing presented by practicing technical consultants and attorneys that involved all attendees acting as regulators in breakout sessions, and, at the conclusion of the workshop, an open discussion on all issues related to the science and management of coastal landforms, including future research needs.

Introduction

As our quantitative understanding of coastal landform function is still evolving, particularly on a small scale lot-by-lot basis, many decisions are made using best professional judgment without the predictive capability of knowing precisely what the impacts will be on the applicant's or neighboring property and resources. Many studies have focused on the broader-scale application of science and management of coastal landform systems, but few have monitored and documented the effects of human activities on a lot-by-lot scale, and then incorporating those findings into our understanding of the larger coastal landform system.

The primary objective of this workshop, *'Can Humans & Coastal Landforms Co-exist?'* was to foster a sharing of knowledge, expertise, and observations by the participants relating to the natural evolution of coastal landscapes, and particularly to discuss how human activities affect and relate to this natural evolution. Only by sharing this knowledge can improvements in the way we manage coastal landform systems be realized.

The impetus for this particular workshop was the completion of a WHOI Sea Grant study 'The Coastal Landform System Sustainability Project: An Analysis of Activities Permitted on Coastal Landforms on Cape Cod in 1999' (O'Connell, 2000). This study documented the types of permitted activities that took place on and adjacent to coastal landforms on Cape Cod in 1999 and their potential effects on coastal landform function and rated by local conservation agents, as well as mitigation being required by local conservation commissions to attempt to minimize these effects. During this study it became obvious that trade-offs and balances are oftentimes necessary in the application of performance standard-based environmental regulations governing activities on coastal landforms.

The individuals who attended this workshop are actively engaged in planning, managing, regulating, engineering, educating, and scientifically studying coastal landforms and their beneficial functions. The managers, planners, and regulators, considering the evolving state-of-the-art in predicting the effects of human activity on coastal landform function on a lot-by-lot basis, must also balance the rights of waterfront landowners to use and enjoy their coastal landform properties, as well as in some circumstances, economics and societal will. In discussing this delicate balance, observations and opinions varied widely on how best to manage coastal landform systems.

The workshop had a very practical applied focus, beginning with presentations on documented results of the interactions between coastal landform functions and human activities, followed by presentations of case studies on a lot-by-lot basis of activities that took place on coastal landforms in several Cape Cod communities. An analysis of the effects of these activities and comparisons of alternative construction practices were provided by presenters and discussed through an interactive dialogue with attendees.

A multi-faceted mock project proposal, incorporating all of the elements presented and discussed in the earlier sessions, was presented by practicing technical consultants and attorneys in

the coastal field. Four breakout groups acted as separate conservation commissions (regulators) deciding on whether to permit, deny, or permit with conditions the various project elements. The project elements were designed around human activities that have been noted over many years to have 'gray areas' in terms of the scientific understanding of the affects of human activities on coastal landform function and thus, permitability. That is to say, the proposed activities have been decided upon differently by regulators in different communities and by the state, due both to a lack of understanding of the precise effects and site-specific conditions. The workshop concluded with an hour-long open discussion. When the time came for the workshop to adjourn, participants were still engaged in lively discussion and debate on coastal landform management.

The workshop pointed out the lack of consistent scientific understanding of the interaction of human activities and coastal landform function, particularly on a lot-by-lot basis. Many decisions are thus made using best professional judgment without the benefit of precisely knowing what the actual impacts will be on the beneficial functions of coastal landforms.

What became obvious as a result of this workshop is the primary reason why opinions varied: we posses a reasonably thorough *qualitative* understanding of the critical characteristics and beneficial functions of coastal landforms. However, our *quantitative* understanding and predictive capability to determine the effects of human activities on coastal landform function on a lot-by-lot basis is still evolving. Site-specific conditions require a re-evaluation of our understanding of the science of coastal landform function and human interaction in every circumstance. There is further need of widespread education on the necessity of a coastal landform ethic of *mobility*, as well as scientific inquiry and documentation of the effects of human activities on coastal landform function on a lot-by-lot basis.

Managing the coastal environment requires a complex balance of maintaining the public benefits provided by coastal landform systems (scientifically-based) and rights of coastal property owners (societal-based). A question posed to the audience in the early stages of the workshop was: Has Massachusetts arrived at the optimum balance of compromises and mitigation methods to maximize the sustainability of the coastal landform system while allowing use, enjoyment and development of coastal landforms?

We invite you to join us in delving into the answer to the question posed above, and the one posed by the title of the workshop: 'Can Humans and Coastal Landforms Co-exist?' by reading the varied and creative dialogue that took place throughout the day, provided in these proceedings.

WELCOME

Dr. Judy McDowell, Director, WHOI Sea Grant Program

Dr. McDowell: On behalf of the Woods Hole Oceanographic Institution and the Woods Hole Sea Grant Program, I'd like to welcome you to today's workshop: "Can Humans and Coastal Landforms Co-exist?" I think you'll find today a very exciting, very novel, and interesting workshop. Many of the ideas and many of the presentations today will focus on conflicts that arise when conservation commissions, homeowners, and towns, try to make decisions to preserve our coastal landforms, to utilize those coastal landforms, to appreciate the aesthetic and recreational benefits of those landforms, and to manage public access to those landforms.

This is not a new topic for Woods Hole Sea Grant. We have pursued many projects over the years related to coastal processes. There was a very successful workshop in October of 1997 that highlighted many of the concerns of landforms along the coast. The work of Graham Giese and the work of Jim O'Connell and others throughout the Commonwealth of Massachusetts have been very important in guiding us to a better understanding of our coastal landforms. And yet, we still have conflicts along the coast, and I hope that today's workshop will enable all of us to gain some insights and provide each of you with some new information on how to handle these problems, and address where else to seek information for better managing our very valuable coastal lands.

I hope that you find this a very informative and enjoyable day, and that you walk away from the workshop with a better understanding of the Massachusetts coastal landforms. So, again, on behalf of the Institution and the Institution's Sea Grant Program, I'd like to welcome you. Work hard, enjoy the day, and preserve our coast.

Workshop Objectives

James F. O'Connell, WHOI Sea Grant Program & Cape Cod Cooperative Extension

MR. O'CONNELL: Thank you, Judy. Good morning and welcome, and thank you all for coming. We very much appreciate it. Your presence can only make the workshop better.

When I looked over the attendance list, I realized that the scientific, the engineering, the regulatory, the public education, the planning aspects, and the collective experience relating to coastal landforms in this room is absolutely phenomenal. You are pretty much the key people in the Commonwealth of Massachusetts dealing with coastal landforms.

Your active participation today will not only help make this workshop successful, but will also contribute to the goals and objective of the workshop, which is to share your knowledge, your experience, and particularly your observations of the natural evolution of coastal landforms, and particularly how human activities affect and relate to the natural evolution of these coastal landforms. By sharing your knowledge, we can only improve the way we manage coastal landforms in the Commonwealth.

The workshop today is going to be recorded, and there will be proceedings generated. So if you have questions or comments, please, state your name, and speak clearly and loudly so your comments are recorded correctly.

This afternoon, we're going to have a series of breakout groups relating to a Mock Conservation Commission Hearing. On your nametags you have a colored dot. That colored dot indicates the group that you will be working with in discussing and analyzing the mock project.

Henry Lind, Eastham's Natural Resource Officer, will facilitate the Blue Group. We also will have scribes at these breakout groups recording the main points of each group discussion. The scribe for the Blue Group will be Heather McElroy from the Cape Cod Commission.

Joe Grady, Duxbury's Conservation Administrator, will be leading the Yellow Group. The scribe for this breakout group will be Steve Tucker from the Cape Cod Commission.

Steve McKenna, Co-Chair of the Town of Brewster Conservation Commission and Massachusetts Coastal Zone Management's Cape and Islands Assistant Regional Coordinator, will be leading the Red Group, with Bruce Tripp, the Assistant Director of the Rinehart Coastal Research Center here at WHOI, as the scribe.

Kristin Andres, Chatham's Conservation Agent, will be orchestrating the Green Group, with Truman Henson, the Cape and Islands Regional Coordinator for the Massachusetts Coastal Zone Management (MCZM) Office, as the scribe.

The presentations this morning were designed around specific issue areas. These issue areas are themes or project types that have been noted over the years as having 'gray areas' in terms of consistency, or lack of consistency, of regulatory decisions.

So the presentations this morning are laying the groundwork and basically preparing you for

a Mock Conservation Commission Hearing this afternoon, which I'm sure you're going to find entertaining, and will hopefully contribute and learn a lot from.

KEYNOTE ADDRESS:

BEACHES AND DUNES OF DEVELOPED COASTS: THE ROLE OF HUMANS IN TRANSFORMING THE COASTAL LANDSCAPE

Dr. Karl Nordstrom, Rutgers University

MR. O'CONNELL: I'd now like to introduce our keynote speaker, Dr. Karl Nordstrom. Karl is presently a professor at the Institute of Marine and Coastal Sciences at Rutgers University. He's been with Rutgers since 1980. He received his MS and PhD. in Geography from Rutgers. He was a 1999 Fulbright Senior Scholar at the University of Greifswald in Germany. He's also a visiting scholar at the University of Western Australia, the University of Amsterdam in the Netherlands, the University of Kiel in Germany, and the Department of Geography at UCLA.

Karl has written a number of books, most notably and recently, in the year 2000, he completed "Beaches and Dunes of Developed Coast." He's also written "Estuarine Shores," "Estuarine Beaches," "Coastal Dunes: Processes and Morphology," and "Living with the New Jersey Shore." He's published 61 articles in refereed journals, 36 chapters in books, and 38 other publications. It's my pleasure to introduce Dr. Karl Nordstrom.

DR. NORDSTROM: Thank you, Jim.

(Slide presentation)

DR. NORDSTROM: Is my voice coming over the loud speaker? Great. Can I have the first slide, and the lights, and the focus. Thank you very much. Most of the slides I'll use to illustrate my talk today will be from New Jersey, which, of course, except in certain places, is quite different from the Massachusetts shoreline. But I think it's a good idea to look at the New Jersey shoreline, not just because I'm from there and I have most of my information from there, but because it is probably the longest — has the history of the longest intensive development in the United States. It has also been singled out by Orrin Pilkey to represent the end point in the evolution of a developed shoreline, and he's used the odious term New Jerseyization to refer to the replacement of beach and dune with seawalls. But as we'll see in these slides, and as you'll see if you come to New Jersey, that is not the end point in shoreline evolution. At least not for the next 50 years.

You can get an idea how vulnerable these barrier islands are by how narrow and how low they are. If we can work with these barrier islands with humans on them, we can probably get humans and barrier islands or humans and landforms to co-exist elsewhere.

Right now I'm taking you to Southern California **(Figure 1)** just to remind us of the worst-case scenario of humans and the coast, and that is the replacement of landforms: In this case, the Dune at Oxnard Shores, California. Not only has the dune been replaced, but the road is actually encroaching out onto the back beach. And of course, bringing development close to the shore means that there will be adverse impacts on what's left of nature as well, seen here in the tram-

pling of the dunes to the left.

Of course, most states now prevent construction in the dunes in their regulations. But even where structures have to be set back at various distances that differ, depending on what state they're in, progressive erosion will once again lead to construction of revetments –- a New Jerseyization scenario.

Figure 1. Oxnard Shores, CA, showing elimination of dune to construct a road

These two slides of pre- and post seawall construction occurred over a period of about six months in California. This is the result of the 1983 El Nino.

UNIDENTIFIED VOICE: Can you go back?

DR. NORDSTROM: Back? Summer of '82. February of '83.

UNIDENTIFIED VOICE: Where is this, Karl?

DR. NORDSTROM: Monterey Bay. We natural scientists like to think that because humans are incompatible with natural processes, eventually we will get urban renewal by an act of God, and natural processes will re-establish themselves. It doesn't happen. At least not where there's intensive development, or more to the point, there is enough economic incentive to bring people back to the shore again.

The top diagram or the top panel is an air photo taken just prior to the March storm in 1961. The second panel is actually during the 1962 storm at the end stages. Those of you sitting in the back may not be able to make out exactly what's depicted here, but you can just look at the dots. The dots are houses. There are fewer dots in this diagram than there are in the top diagram, but there are vastly more dots in the bottom diagram.

Houses were destroyed; overwash platforms occurred; overwash went into the bay creating a new substrate of marsh; inlets were formed; but the inlets were closed almost immediately, within days. I'm showing you the 1992 storm — or the 1992 photo which is just after the 1992 storm: the storm that was of similar magnitude, not quite as bad as 1962, but almost no damage was done to the shore. That is because right after the '62 storm, groins went in; beach nourishment occurred; dunes were rebuilt.

The 1972 picture looks almost exactly the same as the 1992 picture. The 1992 storm in Decem-

ber did almost no damage because the people were more prepared for it than they were in 1961.

Increasing levels of development increase ability to withstand storm damage. Many of my colleagues like to go into a landscape right after a storm to show the incompatibility of humans with natural processes by showing this scenario. All you have to do is come back 10 or more years later and you can see how natural processes are incompatible with humans.

Gulf shores, Alabama, right after Hurricane Frederick. The slogan here was Gulf Shores, Bigger and Better. Bigger buildings. Most of the units in these condominiums were sold before the buildings were ever put on the land, and the buildings were every bit as close to the water as they were before the storm. In fact, as a result of the storm, the mean high water line is closer now than it was before.

That's just one of the kinds of alterations of beaches and dunes – eliminating them. There are other major categories, and they can be broken down into subcategories. And indeed, as you'll see in the next slide, we can break the category Enhancing Recreation, down into another subcategory. So there are many ways that humans alter or interact with the environment, with the landscape, in addition to simply replacing it. Let's look at reshaping landforms because that's not only very common, but it often doesn't require a permit beyond a categorical permit that a municipality may get when they ask, may we bulldoze? Yes, you may bulldoze and reshape. And then they reshape from there on after without requiring a new permit.

The worst reshaping is to accommodate structures such as we see eliminating the dune here at Ortley Beach, New Jersey, pushing the sand seaward, just to accommodate the construction landward.

Let's look at enhancing recreation. That's what I consider the worst problem of developed areas. I'm showing you a scene of Southern California, but I could probably show you a comparable scene in just about any state in the United States and any country in the world. People like flat beaches as recreation platforms. They're creating slabs of sand. They eliminate dunes for easy access or to provide views of the sea. In some cases, they retain dunes, but grade them down to lower elevations.

What's probably worse than all of this that prevents nature from coming back in the area is that the litter is eliminated from the beach, eliminating seeds, culms, rhizomes, nutrients, and little topographic barriers that become locations for sand accretion after it's blown across the beach. In other words, the capability of dunes to come back and evolve is eliminated when you rake the beaches of litter. There is no topographic or vegetation diversity in that scene.

Structures also affect landforms. Seawalls are problematic when they replace the natural environment, but they're not a problem when you have beach nourishment again. Beach nourishment then buries the seawall, giving rise to my favorite expression in New Jersey: the only good seawall is a buried one.

Groins are considered problems because they interfere with the sediment budget, but they are compatible with landforms. We get some very interesting landforms forming around groins because they trap sand blowing across the beach.

Perhaps the most underrated, significant structure out on the beach is the sand fence. They are cheap, they're easily put in place, and mostly they do not require a permit and can be placed seaward in a zone that's normally a restricted area for other types of structures.

Buildings take some heat, too, but other than directly replacing the landforms, we can work with them. We can get landforms around them. They alter wind directions and wind speeds and create scour and deposition zones. And in some cases, if they're placed too low on the ground, the interaction of the landform with the structure leads to the need for subsequent human alterations to keep the structure viable or to make it more usable.

In many cases, like here at Westhampton Beach on Long Island, we can't tell the difference between what the wind scour and deposition is doing and what people are doing to push sand off to the side.

This structure is located on the ground. The dune is actually migrating around it, creating a lunate form to the dune, a usual shape, directly related to the structure, its impact on the winds, the flow of sediment, and people's activities as well. So buildings are actually compatible with landforms, but they're just different kinds of landforms than what you get in a naturally evolving area.

It's creating the need for human actions that's the problem. What you're looking at here (removing sand that is inundating properties) is common in a lot of areas where people elect to have use of the sea rather than a dune that would stop aeolian transport coming into their areas. They are maintaining the system in continuous disequilibrium. Sand blows onto their properties, they bring it out in front of their properties.

In this particular case at Manasquan, New Jersey, the municipality comes along, takes the sediment, and puts it back out on the beach again. In the old days, before we had regulations against it, they just took the sand and moved it landward. Now it goes back out on the beach and flows right back into the properties again.

Municipalities also have their own sediment recycling system. In this case, sand is overwashed onto the road, with a two- or three-year recurrence interval storm. They bulldoze it back up to provide some measure of protection against your garden variety winter storms, and in some cases, supplement it by bulldozing sand up from the beach. If you look at that dune, you get an image of the kind of human altered landform you get in an area where you have a very narrow beach that erodes frequently. That is, it's low, narrow, linear, and vegetation doesn't have a chance to survive and thrive. You have internal structure and surface characteristics that are quite different from the kind of natural dune you would get by aeolian transport.

So the characteristics affected by human alterations are all of the ones depicted on this chart. I've shown you examples of many of them. As a dune morphologist looking in terms of landform evolution, I'm most excited about difference in time and cycles of change.

Cycles of change in a natural environment are more or less storm driven. Cycles of change in a human altered environment are seasonally driven, like recreational cycles in the summer and storm cycles in the winter.

Figure 2. Ocean City, N.J. just after beach nourishment showing resident preference for suburban style landscaping with beach maintained as a recreational platform

It's not surprising considering that we have a different concept of the value of the landscape on the part of humans and on the part of nature that we have a different process of dune evolution, leading to a different kind of dune. If the dune has to be created rapidly, as often happens because people generally don't jump into action unless some kind of coastal facility is threatened and it's almost too late to have a natural alternative, then we get a dune that looks very different from one created by natural processes. The key, I think, is to identify the problem early enough such that we can follow the decision-making and money-levying track to the point where we can plug in to getting a naturally functioning landform. So it's anticipation of problems in the future.

This view of Ocean City **(Figure 2)** is one of my favorite slides. I think everybody who looks at this slide sees something different. Many visitors to the shore think that this human landscape is what a coast should like. I think it's curious that when I see advertisements for the New Jersey shoreline, that we see in New Jersey and I'm sure are shown in Quebec as well, we have a governor walking our biggest stretch of natural shoreline saying, come to the New Jersey shoreline and see this beautiful, natural area. And indeed, sometimes when I go to planning sessions and workshops in New Jersey, people say we have a beautiful natural shoreline that we must preserve. This scene is the "natural" shoreline that people see when they come to many of the municipalities in New Jersey. They think it is beautiful. Suburban concept of landscape taste, wide beach, artificially nourished, but completely flat and raked. You can see the beach from the boardwalk without a dune in the way.

The only naturally functioning part of this environment is the intertidal zone and these little sand streamers that are coming over the boardwalk and into this municipally managed area, the street end, but not into the properties that have barricades. The people in this municipality and the visitors have totally lost their environmental heritage.

I think if you ask these people if they're satisfied with the environment, they would say yes, this is beautiful. One of my favorite quotes from an environmental journal is: "People remain

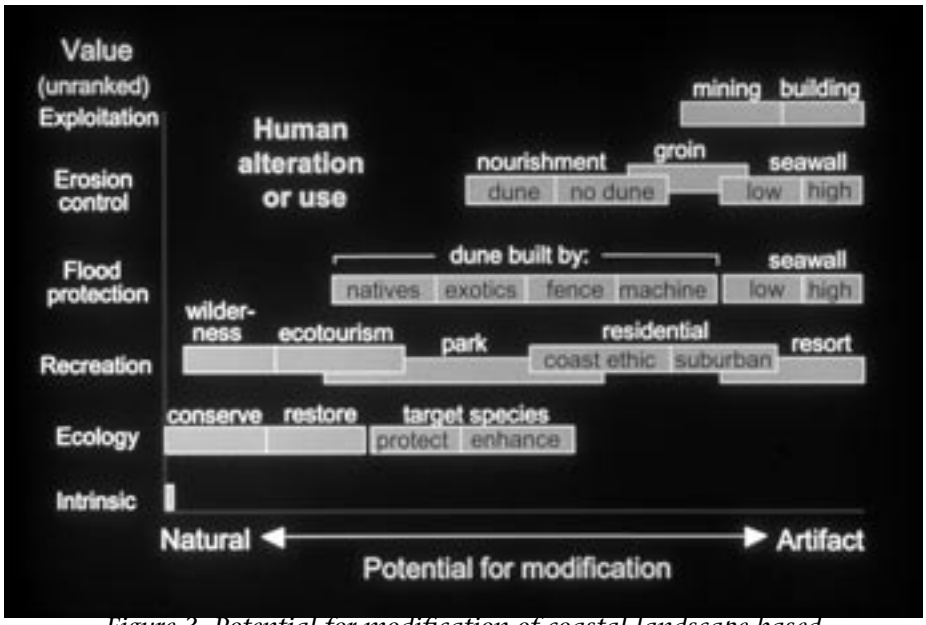

Figure 3. Potential for modification of coastal landscape based on perception of values for coastal resources

satisfied with their environment even as it degrades around them."

Another one of my favorite quotes that looks into the future is: "It's necessary to bring nature within locations of human habitation rather than keeping it in external places of last resort."

How can we gain the environmental heritage that's been lost here? One thing we can do is we can make it part of our decision-making process so that when we try to decide what value we want to maximize at the shoreline, it can be done in many different ways, using many different human alterations or uses, and restructure our decision-making process with natural on one side and artificial on the other side **(Figure 3)**. The key to identifying what alteration or use to make for a given value, let's say flood protection, is to see how far to the left we can take it. So if we're interested in flood protection, instead of building a high seawall, build a low seawall that can be buried. Let's go for building a dune by native vegetation, which takes a little longer, so we have to anticipate the erosion problem before it actually exists.

The slide I've just showed you **(Figure 2**), showed recreation in a residential area, according to suburban concepts of landscape taste. The key to dealing with many of these residential areas, which are a substantial portion of population at the shoreline, is to place them within the coastal ethic box and see to what extent we can drag this box to the left, so that we can introduce some concept of nature-based tourism on private properties. And that is doable.

Here's the start. Many locations in New Jersey did not have dunes prior to 1980. The March 1984 storm came in and did a lot of damage to many municipalities, not so much to the buildings, but to some of the seaward structures. In fact, here in Lavallette, this boardwalk was destroyed. Bill Bradley got some federal money devoted to New Jersey, not surprisingly. The State Department of Environmental Protection did a good thing then. They said, okay, we will pass these federal dollars to you, but you must build dunes. And, of course, there was a tremendous fight on the part of the shorefront residents. They hated dunes more than they hated feral cats and seagulls. But, they had to have this dune. They did insist that the dune be low in elevation and narrow, and that it doesn't — so that it wouldn't migrate landward, and that they maintain this trough landward of the dune so that if any sand blew into the trough, they could take it away and put it

Figure 4. Incipient dune forming on a nourished beach at Ocean City, N.J. after suspension of raking to accommodate nesting plovers

back out on the beach again. Actually, this is about as good as you're going to get for a dune in this kind of environment anyway because the beach is too narrow to support a higher dune.

So that (small dune) is a good thing. Although, to many of my colleagues who come visit, it's laughable.

However, we now have beach nourishment. The State is committed to beach nourishment in all eroding areas. There is money for this; in fact, there's far more money than the nourishment would cost. So instead of having what we saw here in Cape May, New Jersey, back in the early '80s, (one of Pilkey's favorite pictures with the seawall with no beach in front of it), we now have this tremendous resource base that we can create whatever we want to.

We're at Ocean City now **(Figure 4)**. It's one of the two target areas, key areas for restoration, that I can take people to in the field and say yes, we can achieve this. This is an early stage. There's more coming.

The beach was nourished in 1992. This is about 1994. We now have incipient dunes in the upper wrack line that is not longer raked. It's no longer raked because piping plovers discovered this area and nested there. The State Endangered Species Program came in and said you can't do anything with this area and put out these flags and put out warnings. It's not so much that people couldn't trample this area, but the area wasn't raked. Now you see an incipient dune, it's much bigger now, growing by completely natural processes on this resource base. I see some piping plover enthusiasts smiling. Wait till you hear what I have to say later.

Let me backtrack a little bit here. The Endangered Species Program is a very good thing because it will take enclaves like this and prevent people from doing things and shows us what can be achieved. Unfortunately, one of problems is it is geared towards those specific areas.

Notice this bare ground behind the incipient dune. The municipality's still drives the back beach, emptying trash cans, so the incipient dune is disconnected from the municipally managed dune landward.

The next slide, that you've had a hint of, is the municipally managed dune. They did a good thing, and they had time to do it because they have a wide beach. They didn't have to bulldoze a

new dune. They put up two rows of sand fences and planted American beach grass.

This is what happened six years later. All of that growth is by natural aeolian accretion on that base of planted *Ammophila*. There are now many different species here that colonized naturally.

Part of the stability of this dune is because they have gradually placed sand fences seaward, so the dune would grow outward rather than upward, so the residents would retain some views of the sea, although the dune is beginning to build so high now that it's obscuring some views and the city has been sued.

That previous dune was six years worth of dune growth from a flat beach. There were areas where there was some incipient vegetation forming behind the location where they built that dune, beginning back in the mid '80s. This is the landscape that you get with about 15 years of dune evolution. Much more richness, diversity, much more aesthetically pleasing (of course, beauty is in the eyes of the beholder) but a better image of nature, at least in the back dune environment.

Another site that's interesting for other reasons is Avalon. Ocean City is maybe two barrier islands up. This is Avalon, New Jersey. Can I get that focused a little bit? Very good coastal condition -- environmental condition.

Right after the 1962 storm that did the damage you saw in that previous slide, but not so much here in Avalon, they were able to purchase several city blocks worth of shoreline for the astronomical price of $800,000, if you can imagine what that would buy now: no property on the shoreline. And they were able to do this because the people were willing to sell because they saw the damage that was caused by that major storm. So they acted instantly.

That then allows them (to use this as a control site) to see what can happen under natural conditions, aided in this case because sand is actually moving from the inlet location to here, so it's an accretional area; it's not an erosional area. But that, too, is a good thing. This is now a municipal public resource, and they actually have a backpassing operation, the kind of operation that makes use of the sand that's already there. Beach nourishment operations may not be viable in the future (because of diminishing sand supply), but they are if they're backpassing operations. You're not getting new sand from somewhere else. So they take sand here and they deposit it right up there in a critically eroding area. I'm going to show you two slices of this landscape. One in the natural area, which shows you what we can achieve if our restoration goal is purchase and exclusion of people. This area up here that's periodically nourished but maintained in a very narrow beach state shows what we can achieve in those areas where we can restore things and have them enhanced by human processes. And they look quite different, but they contain many of the same species.

Here's the natural area that was in the foreground there. We have a traditional, standard (environmental) gradient proceeding from the American beach grass foredune to a dune swale here, mostly comprised of Spartina patens, a marsh species. And then your bayberry location behind that, your woody shrub zone, and the pre-1962 storm dune.

Farther to the north in that eroding area that I pointed out, this is the landscape you see.

I don't know to what extent you can make out the very consistent slope here, sloping down into this swale, and you may be able to barely make out a flattop surface there. That is an artificial dune — that's a dune dike created by dredging sand from the inlet and depositing it there. Through time, that is evolving. With this kind of a landscape, you begin to get the sense of topographic diversity even though there is none. It's actually vegetational diversity.

Part of the reason why you have such a diverse landscape and so many species located close to the zone of salt spray and wind stress is because the municipality here has decided to increase the level of protection from the 100 year recurrence-interval storm here, mandated by FEMA, to protect against a Category Three Level Hurricane. They did this by putting sand fences out here, causing the dune to build high, and then one layer of sand fencing above another one, that further sheltered this area, stabilized it, and caused it to evolve into this backdune environment.

So, instead of getting the environmental gradient you would get under natural conditions over hundreds of meters, you're getting it in over tens of meters. So you're conveying an image of nature that contains all of the variety in a very restricted space.

UNIDENTIFIED VOICE: Is this picture of a very narrow —

DR. NORDSTROM: Yes.

UNIDENTIFIED VOICE: — beach stripped in the previous one?

DR. NORDSTROM: That's up here.

UNIDENTIFIED VOICE: Wow.

DR. NORDSTROM: And that is maintained in that state because sediment is taken from this accreting area, and deposited up there. Maybe not directly in that area, but it then begins to move south and nourishes that area. So it's maintained in a condition of a very narrow beach and a very high dune. Without that beach nourishment, it probably wouldn't survive. But it's not a grand-scale beach nourishment. It's a municipally managed beach nourishment or backpassing with their own sediment.

What you're seeing are alternative restoration outcomes for developed areas. The top one represents the buyout type of restoration outcome, where you have just a completely natural system. You can read on the diagram all the advantages you have. I'd like to concentrate on the bottom three because these are more appropriate where humans are a prominent element in the landscape.

Where you don't have much space available, you've got two alternatives. There are many sub-alternatives, but basically in New Jersey, at least, a truncated gradient and a compressed environmental gradient are the alternatives. I've gone round and round with a biologically-oriented colleague, and she says, we must have a truncated gradient because it is pure nature even though it's truncated. And I said, no, let's have this compressed gradient because let's show people what they can get if they get involved in the restoration process. We haven't resolved that issue, but I leave it up to whoever has the capability to implement either of these. And, of course, much of it

depends on the attitudes of the residents and the power of the conservation commission.

The truncated gradient is essentially the seaward portion of a naturally functioning dune, and it is completely naturally functioning. The problem is it has only one of the microhabitats. It doesn't have the crest or backdune. It's a mobile surface, which is good; it gives the image of dynamism that I think people have lost at the shore.

I was asked by the manager of one municipality, "If we're going to have dunes, you say, let's have these incipient dunes out on the beach. Don't you realize the first storm's going to come along and erode them." I said, "Yes, and that's a good thing. People will see that the shoreline's inherently dynamic, rather than walking out there and seeing that recreational platform day after day and thinking there's no dynamism there."

The advantages are listed on the diagram. The residents can maintain views of the sea because this dune will actually be eroded by the three-year recurrence interval storm, maybe a little more. There will be some sand inundation.

The compressed environmental gradient is relatively species rich because you are now stabilizing the crest here. It's got human help now, and you're creating a sacrificial foredune so that you can give the dune behind it time to survive. In many cases, dunes are considered a sacrificial structure. Let's consider something else a sacrificial structure and retain the dune resource. The advantage of this is you've got time for those backdune species to evolve.

The favored gradient (Restoration Alternative 4) is actually my favorite gradient because it brings the shorefront residents into action. They allow the dune to migrate onto their property, and indeed they can do something with the back of the dune, like plant species and actually enhance the likelihood that some of these species will survive. It's relatively species rich. You have microhabitat variety. You have several microhabitats. And just as importantly as anything else, you have the incipient dune zone where you have a mobile condition and you see dynamic nature. You've got back just about all aspects of your environmental heritage, except the width dimension. So the idea is to incorporate people as part of the landscape and allow them, to the extent possible, to use landscaping that mimics nature.

This next diagram is a summary diagram. I'll talk you through it so you don't get too confused. The key is to look at it as one place in time. It's not a segment of shoreline. Under natural conditions, the beach, the foredune and the back dune, are relatively wide and are migrating landward due in response to progressive sea level rise. At some point in the evolution process, people come in, alter the landscape, build houses. It doesn't stop the migration of the shoreline, of course, and eventually the back dune and the foredune are eliminated, increasing the hazard potential and initiating calls for some way of protecting against flooding and overwash, seen here in the seawall. That's okay for a while, but as soon as the beach is eliminated and they've potentially lost everything, there are cries to replace the beach. Now, the Corps can't use recreational benefits, but the State can use recreational benefits to levy funds and get people behind it. We could do that beautiful thing that Ocean City, Maryland did, in that the State pays for the recre-

ational benefits and the Corps pays for the protection.

At first, if the beach is viewed as a recreation platform, it is raked. Ideally, the seawall becomes buried by the increase in the aeolian transport that occurs after a beach nourishment project. In some cases, fences may be placed. Hopefully, the seawall is buried first, so you lose site of it. Subsequently, a dune may be created as a dune dike. But if piping plovers discover the beach, then your likelihood of stopping raking and getting (natural) dunes is enhanced.

Of course the beach fill runs out unless maintenance nourishment is scheduled, as is the case in New Jersey for 50 years. Unless that happens, you don't get your beach back, and you may lose the dunes. The more you can commit yourself to long term and more frequent fills, the more you can retain a target shoreline that protects the dune. The difference between this and a more traditional engineering approach to the shore is that the dunes are now one of the targets for protection rather than being the sacrificial structure to protect the developments behind it.

I've got this little favored gradient portrayed on the diagram because at some point, once the concept of dunes and their value is in the minds of the residents, they may allow dunes to migrate onto their properties or at least introduce landscaping with vegetation that's compatible with natural vegetation.

The key to restoration in developed areas is to recognize the difference between the human tendency that wants a stable system managed for a restricted number of resources and a natural system's tendency to be dynamic, and not to view these conditions as bipolar opposites but as part of the same spectrum, where we can achieve some kind of compromise between natural dynamism and human needs.

Compromise. Probably the least compromise is required on the part of municipal workers. We can establish no-rake zones where cultural litter is removed manually, leaving the natural litter of the seeds, culms, rhizomes, and nutrients so that incipient dunes can grow. Some of you may say, well, that is not possible, it costs too much, but, no, volunteer labor will work. I've talked to people in municipalities that do this; they say volunteer labor is readily available.

Minimize vehicle use on the beach. Suspension of raking will minimize use of those vehicles on the beach, as will keeping people from driving out on the beach to empty trash cans. As in a natural park area, we can make people who take litter out to the beach bring it back into the developed zone and deposit it.

At some point, after you've got a dune, pull out the sand trapping fences. They're probably no good for piping plovers anyway; they can't escape any predators on the beach. Maybe use fences for managing blowouts because you have to retain some level of protection, otherwise people won't buy into the process.

Change the expectations of tourists and residents with some kind of an education program. Developers and property owners are likely to perceive that they are making the greater sacrifice, but not necessarily, because many people who actually have naturally functioning and naturally landscaped properties like them better than their neighbors, and they laugh at people who demar-

cate their property line and try to push a suburban, or in this case, an Italian palazzo conception of landscape taste farther seaward. What is the appropriate image of the landscaping that is really important.

Scientists like me have to make sacrifices. We have to consider that humans are intrinsic to the evolution of the future landscapes. They are not an aberration. They are not an overlay on a natural system. They are part of it.

We have to define the new significance of "natural." We've seen how human altered nature looks different. It looks different spatially, and it'll have a very different natural trajectory. I'm anticipating where the environmentalists come in. I've identified a couple of target states for restoration that apply to New Jersey. I'm sure you can give me some target areas in Massachusetts. That is, communities, municipalities that have really achievable restoration outcomes that other municipalities should adopt.

We have to look at smaller temporal and spatial scales. We don't have to worry ourselves about what is going to happen in 500 years, especially since these restoration outcomes don't interfere with what people do in the future. That's really the most important bottom line.

In terms of environmentalists, they're likely to consider that they have to make the biggest sacrifice. The first one listed applies anywhere, even in natural areas. The alternative of accepting a new natural trajectory I think, well, I know, bothers some of my bioscientist colleagues. Protecting target species is a good thing, those species that do certain things for the landscape that's already been created. But that landscape will evolve. Then what happens if the dunes or the back beach become vegetated? Piping plovers no longer like a vegetated area. Does that mean you come in and pull out the vegetation? No. Things like that can't happen. There has to be some other way. Piping plovers will go somewhere else. And the more you commit to nourishment throughout the entire state with frequent nourishment, and the more dynamic it becomes, the more spots they have to go to.

Practicality. This last one will probably cause you to raise some eyebrows. If we want this "favored dune gradient" and want people to be incorporated into the landscape, and in this case in New Jersey, to allow the dune to migrate onto their properties, the dune will fall within a permitted zone.

In New Jersey, the dune falls under the Coastal Area Facility Review Act, and something that a resident could have done before the dune migrated onto their property, now requires a permit. We should probably ease the ability to get a permit if residents allow something natural to happen on their property, to the extent, of course, that what they want to do with their property doesn't make it a predator for the new species that now is occurring on their property.

So, can humans and coastal landforms co- exist? Yes. But they won't be our grandfathers' landforms, and they will depend on human actions and values. Right now the front-running human value and human action is to create a protection structure; but, as you can see, there's a fine resource base that we can work with in achieving lots of restoration outcomes.

Figure 5. Steps in a 5-year coastal landform restoration program

So unless we depend on human acts and optimize different values, all we're going to get is the occasional landform garden.

This slide **(Figure 5)** identifies the steps in the restoration program I'm following now in my five-year plan. As you could probably guess, I'm spending most of my time identifying work on the target states for restoration, but all of these, including stakeholder attitudes, are important, too, because we want to find out who is amenable to what.

We just had a dissertation completed at Rutgers that evaluated the differences in stakeholder behavior between shorefront property owners who lived on their properties and shorefront property owners who rented their properties. Tremendous difference in attitudes and approaches. As you might guess, the property owners who lived there like dunes, wanted them, didn't care about obstruction of views. The nonresident owners hated dunes, wanted them out of the way. They thought they interfered with the resale or the rental value of their properties.

So, I hope I've been optimistic. I think we're getting some interesting landscapes that are evolving. The real bottom line in an intensively developed area is that we either get these kinds of landscapes by involvement — by putting money in — or we just get those flat recreational platforms.

I'm sure things are quite different in Massachusetts, and I look forward to finding out what's going on here; what you can tell me that I can take back home or take out to other states in order to achieve better restoration outcomes and a more viable and dynamic system with more resource options for the future.

Thank you.

UNIDENTIFIED VOICE: In planning and managing along the New Jersey coast, which includes a lot of restoration, is there any mention of time frame here? Are you looking at five years, 10 years? Are people asking questions, what do they want the coastline to look like in 50 years or 100 years? The concept of short-term, versus long-term?

DR. NORDSTROM: As you can probably guess, there's very little thought given to the long-term, which is why the changes we're observing in the restoration outcome I showed you at Ocean City and at Avalon are so important because they occur within that five- to 10-year or 15-year time frame used by municipalities. And more importantly, these dunes can be restored very

rapidly after the beach is nourished to cause people to think that they got a good deal right away, rather than have to wait for something else to happen.

I think that the best way to incorporate as many voices as possible is to look at the short-term and imagine the shoreline as going through that last time-history of changes, depicted earlier, where you have some dynamism (controlled dynamism, restricted landforms), but you preserve some kind of an environment through time, so it looks like you're not going to reshuffle the deck many years down the line.

I think the more we can show everyone, including scientists, something that mimics the present image of nature and that's a good thing for the future, it is better than saying, oh, 100 years from now things are going to look dramatically different. If you don't do this (build a dune), this (duneless landscape) is going to happen. And we're conveying an image that people just can't get their hands around. So for just about every reason we can imagine, no, there's no long-term planning other than some kind of notion of sustainability.

UNIDENTIFIED VOICE: My question sort of follows up on what Jeff has, and that is, what is going to be the impact of rising sea level and especially if it's at an increasingly higher rate of sea level rise in the future than we've seen in the past?

DR. NORDSTROM: At some point, if we want to keep these kinds of options, we may have to introduce some kind of a structure offshore, like a sill, a perched beach. I don't know whether you're familiar with the perched beach concept, where you have a structure offshore that holds the beach in place.

Just about any alternative that we think is crazy and undoable is already being effectively tested by the Japanese, and these will happen. I think to try to come up with a solution now for what sea level is going to look like 100 years from now just won't work for a large number of reasons.

I do think that there will be some kind of part engineering and part natural solution to sea level rise, so 100 years from now, we still do have beaches and dunes. I can't predict that any better than anybody else can.

MR. O'CONNELL: Before we take any more questions, again, the conference is being recorded for the proceedings. So if you can state your name and then speak a little more loudly when you ask questions, it would be appreciated.

DR. NORDSTROM: Yes?

MR. WILBER: I'm Jude Wilber from the Falmouth Planning Board. In the local community here, we are now undertaking an approach to long - very long-term planning, and it seems to me that in your short-term approach here, the 10 to 15 years of a developable state, it seems to be the practical unit on which you have to show progress. However, in our approach here, we're trying to do something a little bit different; that is, we're trying to envision actually what we are working for in a 100 year time frame. And then in realizing that, we will have to show progress on a much shorter time scale.

My question is, why would you avoid this sort of 100-year vision? What is it — does it provide

conflict in stakeholders' lines and, in fact, engineers' lines, or, in fact, planners' lines, what it is you're actually trying to work toward over a longer period of time?

DR. NORDSTROM: I'm actually trying to work towards that solution that you saw to the far right of that time series. That is a sustainable beach and dune width that are small and completely naturally functioning because I know in many developed areas — in areas only undergoing development now in South Carolina — you aren't going to pull people back away from the coast. And I think that — I didn't mean to try to dodge the issue — I think in 100 years that is an achievable outcome, and that is my target outcome because, once again, we're in the spirit of compromising. It allows people to see something that they can invest in now and will be there forever.

Now, in locations where you don't have much development, you can begin to pull people off of an eroding coast, but that isn't working too well, as we've seen. Spencer Rogers has made that point very clear in North Carolina.

But you may also say that many of the strategies that I've been presenting to you are for statewide implementation and far more creative strategies can be employed at the municipal level, and I'm interested in hearing what you have to say.

MR. O'CONNELL: We're going to have to cut the questions off at this point and move on. But again, there'll be time for further discussion at lunch, and there'll also be an open discussion session this afternoon at 4:00 o'clock.

If you want to learn more about Karl's work, I'd suggest his most recent book, *Beaches and Dunes of Developed Coasts*, published by Cambridge University Press. A lot of these photographs, as well as other photographs around the world, are included in his book as well as a lot of his discussions. I would highly recommend that book if you want to pursue some of his ideas.

One quick comment. Sand fencing does require a permit in Massachusetts.

DR. NORDSTROM: Oh, good for you.

MR. O'CONNELL: As does basically any activity that would have a potential alteration of any coastal landform in Massachusetts, so perhaps we're a little more progressive.

THE CONCEPT OF COASTAL LANDFORM SYSTEM SUSTAINABILITY

Dr. Graham Giese, Woods Hole Oceanographic Institution

MR. O'CONNELL: I'd like now to introduce Dr. Graham Giese. Many of you may know Graham or are probably familiar with his work. Graham is an oceanographer emeritus in the Geology and Geophysics Department here at WHOI. He's been at WHOI, I believe, for 40 some-odd years. He's conducted a number of studies relating to coastal processes, many around Cape Cod and the adjacent region. He was also instrumental, along with Les Smith, who is here also, and Gary Clayton, who I don't see here, and others, in providing the technical background for the performance standards in the coastal section of the Wetlands Protection Regulations.

It's my pleasure to introduce Dr. Graham Giese.

DR. GIESE: Thank you, Jim.

It was delightful for me to hear Karl's talk, and it was very heartening to hear what he and others are doing in New Jersey. I think there's good news in Massachusetts also.

I'm going to give a talk about the concept of sustainability of coastal landform systems in the form of a dialogue, an imaginary dialogue between two people. The first to speak will be a person who asks a series of six questions.

Question One: What is meant by the phrase "the sustainability of a coastal landform system"?

Answer: The sustainability of a coastal landform system refers to the benchmark condition in which a complex of interdependent coastal landforms is naturally maintained over time, while the individual constituent landforms are modified and moved in response to forcing by waves, wind, tides, and changes in relative sea level, as well as by various biological processes.

The person who's asking the question looks a little disturbed.

His second question: That's pretty abstract. Please clarify, specifically with respect to Southeastern Massachusetts.

Answer: In Southeastern Massachusetts, the complex of coastal banks or bluffs, beaches, dunes, barrier beaches, and marshes is sustained through the processes of sediment erosion and deposition. The banks or bluffs erode primarily through wave action, and in so doing, provide sediment to maintain the other landforms-the beaches, dunes, barrier beaches and saltmarshes. The sediment is moved from its erosional source to the depositional forms by waves, tides, and wind. Most of these depositional landforms undergo phases of both deposition and erosion either storing sediment or releasing it to other landforms.

Question Three: Why do you refer to the natural sustainability of these systems as a benchmark condition?

Answer: Because it can be used as a reference against which one can evaluate the impacts of projects, that is, existing or proposed activities upon the affected coastal landform system.

Question Four: Since human activities along our coast seem so frequently to impact our coast-

al landform systems, do you believe that humans and coastal landforms can co-exist?

Answer: Humans and coastal landforms have co-existed in Southeastern Massachusetts for many thousands of years. In fact, for most of that time, humans have come here to take advantage of the resources provided by the local coastal landform systems. Most of the activities that have decreased the sustainability of our coastal landform systems occurred during a roughly 50-year period between the 1920s and the 1970s. A number of recent local coastal activities will increase the sustainability of coastal landform systems. Examples include the dredging of beaches on the updrift side of jettied inlets in order to nourish the beaches on the downdrift side, opening dikes restricting tidal flow to saltmarshes, raising homes onto pilings to permit dune migration, and moving homes landward away from the encroaching edge of eroding bluffs. We're definitely going in the right direction.

Question Five: Well, then what's the problem? Why should we go to all the trouble required to evaluate projects with respect to their impacts on the sustainability of local coastal landform systems?

Answer: To provide information, to provide knowledge, to provide understanding, and to provide a basis for making future decisions.

Well — and this is Question Six — in making these decisions, how does one quantify the impact of a project? How does one quantify the impact of a project on the sustainability of a coastal landform system?

Answer: It's difficult. It's usually more of a qualitative than a quantitative judgment. The positive and negative impacts can usually be agreed upon, but determining the degree of the impacts is more difficult.

Consider a seawall to be constructed to protect a grandfathered home on an eroding bluff, with the stipulation that a sand beach be maintained in front of it. If someone arriving on the Mayflower 400 years ago had built such a wall on outer Cape Cod's east coast, today it would extend 1,000 feet offshore at a location where the water now is 20 feet deep. How would this impact the adjacent landforms?

And then he becomes even more serious and says: Since we defined our benchmark as a naturally maintained complex of interrelated coastal landforms, how much of a negative is the annual expenditure of energy required for the beach nourishment? How much of a negative will this be fifty years from now if the Kyoto Agreement on global climate change has actually been agreed upon by then?

But now the person answering the questions begins to look disturbed himself. His answers have become questions.

Thank you. Are there any questions? I have a minute or two.

MR. O'CONNELL: No questions?

DR. GIESE: We'll have plenty of time later.

MR. O'CONNELL: That was great. That was wonderful.

THE COASTAL LANDFORM SYSTEM SUSTAINABILITY PROJECT: AN ANALYSIS OF ACTIVITIES PERMITTED ON COASTAL LANDFORMS ON CAPE COD IN 1999

James F. O'Connell, Woods Hole Oceanographic Institution Sea Grant Program, and Cape Cod Cooperative Extension

DR. GIESE: It's my pleasure to introduce Jim O'Connell. Jim is a Coastal Processes Specialist with the Woods Hole Oceanographic Institution Sea Grant Program, and also with Barnstable County's Cape Cod Cooperative Extension. Prior to coming to Woods Hole Sea Grant, Jim was coastal geologist for 13 years with the Massachusetts Coastal Zone Management Office, and following that he was the Marine Resources Specialist with the Cape Cod Commission. Jim chaired the state's Coastal Bank Delineation Task Force and the Land Subject to Coastal Storm Flowage or Coastal Floodplain Task Force. And of course, as initiator and chair of the workshop planning committee, Jim is largely responsible for all of us being here today. Thank you, Jim.

MR. O'CONNELL: How well are we doing in Massachusetts in maintaining our coastal landforms? Are we adding to or detracting from the beneficial functions of our coastal landforms on both a short- and the long-term basis? Most observers that I've discussed this with over the years have suggested that we are not maintaining our coastal landforms, but the data to substantiate that statement did not exist, until recently.

The WHOI Sea Grant Program, in cooperation with the 15 towns on Cape Cod and the Cape Cod Commission, recently completed the Coastal Landform System Sustainability Project. The study was a year-long effort that took place throughout 1999. In this presentation I'm going to present the procedures and results and implications of that study.

In order to appreciate the procedures, the methodology, and the results of this study, we have to understand how coastal landforms evolve naturally, and particularly how human actions affect this natural evolution.

(Slide Presentation)

The first slide, please.

All coastal landforms have critical characteristics and beneficial functions. For example, a coastal bank which is subject to rigorous wave activity erodes and provides the primary source of sediment for beaches, dunes, and barrier beaches, as well as near-shore areas in Massachusetts **(Figure 6)**. Without this material eroding from coastal banks, many of our beaches, dunes, and barrier beaches would not exist today. Coastal banks also provide the public benefits of storm damage prevention and flood control to landward resources and structures.

So the critical characteristic of a coastal bank subject to wave activity is its ability to erode and supply sediment to other coastal landforms, and they provide the beneficial functions of storm damage prevention and flood control for other coastal resources, as well as to landward structures.

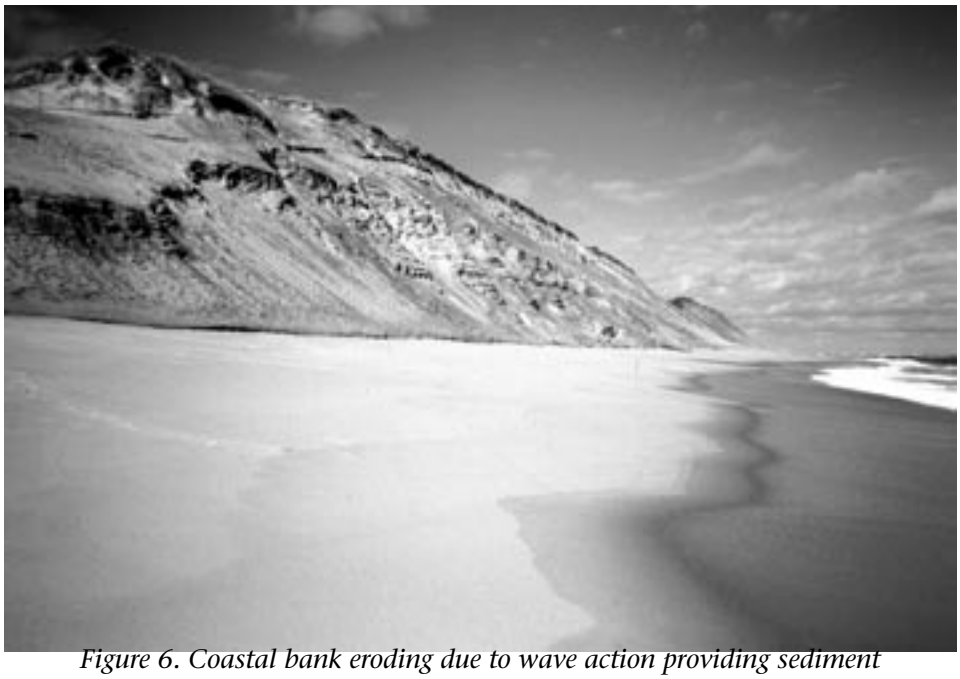

Figure 6. Coastal bank eroding due to wave action providing sediment to beaches and dunes, Wellfleet, Massachusetts

We also have another type of coastal bank listed in the Wetlands Protection Regulations that is called a vertical buffer bank. This is a coastal bank that is relatively stable, usually densely vegetated, not subject to rigorous wave activity, and erodes minimally primarily due to wind and rain runoff. Its critical characteristic is its stability, and due to its stability it can provide the public benefits of storm damage prevention and flood protection to landward areas and resources.

This slide shows a vertical buffer bank, although I had very difficult time finding what's referred to as a vertical buffer bank — that is — a bank that erodes so minimally that it doesn't supply sediment to other landforms. All coastal banks supply sediment under certain storm conditions, its a matter of degree or volume.

Coastal beaches, because of their gradual slope and their permeable nature, dissipate wave energy. In doing so they change shape and volume and also erode. As shown on this slide, when beaches erode, they provide that sediment to other beaches, downdrift dunes, and barrier beaches as well. So in the act of eroding, changing shape and volume beaches dissipate wave energy and thus provide the benefits of storm damage prevention and flood control to other resources, as well as structures along the shore.

Coastal dunes, because of their form and volume, provide a reservoir of sand, which under storm wave conditions erode and provide sediment to beaches, dunes, and other downdrift landforms, as can be seen here.

The vegetation on coastal dunes facilitates deposition of wind-blown sands thus building of volume of the reservoir of sand, which is used during coastal storms. Dunes provide the public benefits of storm damage prevention and flood control, as well as wildlife habitat, aesthetic, and recreational benefits.

The critical characteristics of a dune are its ability to change form, volume, migrate landward, laterally and seaward due to winds and waves, and its ability to be able to erode and provide its reservoir of sand to other landforms. So it's critical characteristics are its ability to erode, supply

this material to other downdrift areas; and, the vegetative cover is critical to allow that reservoir of sand to grow, particularly after storms.

Barrier beaches consist primarily of beaches and dunes. So the critical characteristics of barrier beaches are identical to what I just outlined for beaches and dunes. But in addition, barrier beaches, as a result of storm overwash, tidal inlet dynamics, and relative sea level rise, for the most part migrate landward, particularly the more narrow barrier beaches. In doing so, they provide storm protection to landward resources and landward development and allow for the existence of bays, estuaries, saltmarshes, and other coastal resources.

So the critical characteristics of barrier beaches are those that we identified for beaches and dunes, but also the barrier beach should be able to migrate landward. If its prevented from migrating landward, as a result of a seawall for example, then the seaward beach will eventually narrow and possibly disappear, causing adverse impacts to its beneficial functions.

Saltmarshes, in addition to their biological characteristic of providing detritus and organic matter for many marine organisms, also provides flood storage capacity and dissipates wave energy, helping to protect other landward resources, as well as structures. This is due to its peat substrate, which is resistant to erosion, and its vegetative cover. So, saltmarsh critical characteristics are basically its peat substrate and its vegetative cover, providing flood storage and storm damage prevention or reduction. The expansive saltmarsh shown here exists primarily due to the presence of the fronting barrier beach creating a sheltered environment necessary for saltmarsh growth.

Land subject to coastal storm flowage is a listed wetland resource, although we do not have performance standards for it in the Wetlands Regulations, yet. A task force was convened in 1995, which I chaired, that generated recommendations for performance standards for this resource, however they have not as yet been adopted by the state.

Land subject to coastal storm flowage dissipates wave energy due to its gentle slope, its sediment and soil characteristics, and its vegetative cover. Because of its gentle nature, land subject to coast storm flowage allows other resources, such as saltmarshes, to migrate landward in response to relative sea level rise. If we were to prevent the migration of saltmarshes onto land subject to coastal storm flowage, by construction of a bulkhead for example, then the marshes will eventually narrow and possibly disappear in future years as a result of relative sea level rise.

So we can understand now that the critical characteristics of all of these coastal landforms require mobility. They require movement. They require reshaping, migration and ability to erode in order to provide their public benefits.

So the question is, how are we doing in Massachusetts in protecting these critical characteristics, critical functions and public benefits provided by our coastal landforms?

As I had mentioned, the WHOI Sea Grant Program recently published *The Coastal Landform System Sustainability Project: An Analysis of Activities Permitted on Coastal Landforms on Cape Cod in 1999*. The report is available through the WHOI Sea Grant Office.

The goals of the project as shown here were to quantify, on a town-by-town basis, the gains

and the losses of coastal landform system sustainability resulting from decisions of local resource managers and regulatory agencies; to identify the state and local policies and/or regulations that resulted in these gains and losses to coastal landforms; to describe permit conditions or technical approaches that can assist in maintaining their beneficial functions or their sustainability; and, to identify future research needs that can add to our understanding of the interaction between coastal landforms and human actions that affect these beneficial functions.

To achieve the goals of the project, we generated a series of questions that were to be answered for each permitted project on a coastal landform. All of the project questions are based on whether the project will affect the critical characteristics that were just described for each coastal landform.

For example, (overhead transparency) one question for a project proposed on a coastal bank is, 'will this activity impede or permit the erosion of the coastal bank by wave action'? If it impeded the erosion of the bank reducing source material for beaches and dunes, it received a negative rating.

For a coastal dune, one question was, 'will this activity enhance or impede the vegetative cover of the dune'? Again, keeping in mind the critical characteristics of these landforms that were just described. If you destroy the vegetative cover the dune will become highly unstable.

Other questions for dune were, 'will this activity decrease or increase the volume of the dune' and, 'will this activity impede or permit the exchange of sediment between the dunes and the adjacent coastal beach'?

Based on our rating scheme, each question could have received a positive or negative rating or it could have received a no impact rating as well.

An example of a question for coastal beach was, again keeping in mind the critical characteristics of this landform, 'will the activity enhance or impede the along-shore or cross-shore sediment by wave action', and 'will the activity increase or decrease the volume of the beach'?

For an activity on a barrier beach, questions were, 'will this activity enhance or impede the deposition of sediment, having an effect of decreasing the height or the volume of the barrier beach', or 'will the activity impede the landward migration of the barrier beach' as a result of this particular activity?

For saltmarshes, 'will the activity enhance or impede the saltmarsh vegetation', or 'will the activity disturb the peat layer of the saltmarsh or impede the tidal flow into the marsh itself'?

And for land subject to coastal storm flowage, 'will this activity enhance or impede the natural landward migration of another coastal resource, like a beach or saltmarsh, onto land subject to coastal storm flowage in response to relative sea level rise — which is predicted to accelerate somewhat in the coming years?

To answer these questions, particularly for projects that are proposed under a permit scheme, the most appropriate people to answer these questions were determined to be the town conservation administrators, conservation agents, and natural resource officers in all of the 15 towns on Cape Cod. Those are the individuals that gather the project and site-specific information for all

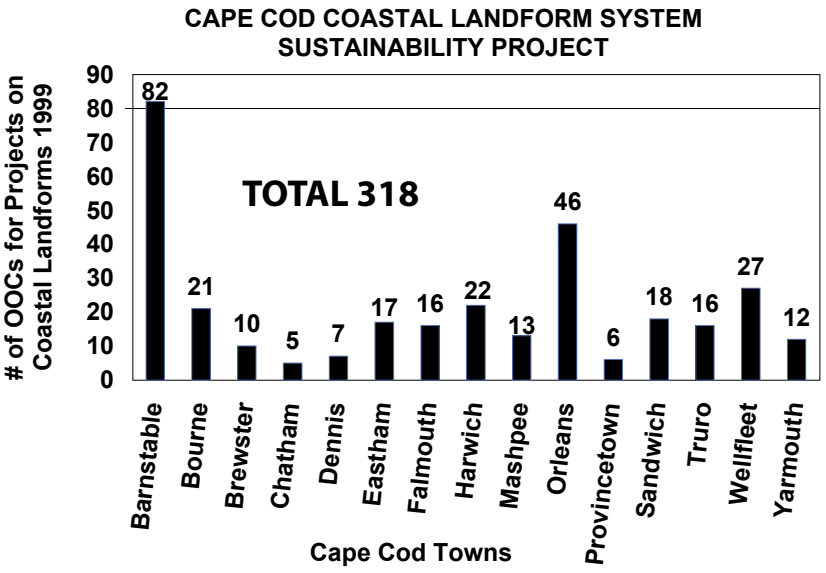

Figure 7. Number and distribution by town of activities permitted on or adjacent to coastal landforms on Cape Cod in 1999

activities proposed for a permit on or adjacent to a coastal resource. They conduct many site visits, and oftentimes they recommend conditions or decisions to their conservation commissions. These are the people who actively participated in the project in 1999 on Cape Cod (overhead transparency).

We filled out a questionnaire for all permitted activities on or adjacent to a coastal landform in each of the 15 Cape Cod communities. The distribution and number of projects that we reviewed that received Orders of Conditions in 1999 are shown by town on this table **(Figure 7)**. We only analyzed permitted activities that received an Order of Conditions for activities that were permitted in 1999. As seen on the table (**Figure 7)**, we analyzed and filled out a questionnaire for a total of 318 Orders of Conditions.

Issuing an order of condition for a permitted activity is only one of many responsibilities for conservations commission. For example, from this table **(Figure 7)** you can see that the Town of Falmouth issued 16 Orders of Conditions for activities on or adjacent to coastal landforms. In reality, they issued somewhere in the vicinity of 114 Orders of Conditions for activities in both coastal and inland wetlands. So, there's a lot of activity taking place in the vicinity of inland wetlands as well. We just focused on coastal landforms.

At the conclusion of analyzing the 318 Orders of Conditions, I tallied up all of the ratings resulting from the questionnaires for each permitted activity based on a rating scheme we devised. The rating scheme applied to each questionnaire ranged from a minor impact of 0.5 to a major impact of 3.0. Each activity was rated either a positive, which added to the beneficial function of the landform, or negative, which detracted from its beneficial function. A 'no impact' rating could have been applied as well. The results of these ratings are shown on this table (**Figure 8)**.

So, for example, there were four permitted projects for new coastal armoring of a sediment source coastal bank without requiring any supplemental nourishment, and they were, as you can see, rated differently, although all negative. The letters next to the numbers represent the towns that these projects were permitted in. For example, "BA" represents Barnstable; "D" represents Dennis; and, "O" Orleans. So there were actually four of them, but you can see that they were different ratings.

For new armoring with nourishment, a negative rating was applied to all these projects as

List of Permitted Activity & Ratings Identifying Impacts on Coastal Landform Sustainability

Cape Cod COASTAL LANDFORM SYSTEM SUSTAINBILITY PROJECT: 1999

0.5 very minor 1.0 minor
1.5 somewhat significant
2.0 significant 2.5 v. significant
3.0 major

Activity Rating by Coastal Landform
(see Table 1 for ranking numbers)
(see Table 2 for town abbreviations in parentheses)

PERMITTED ACTIVITY	***Bank***	***Beach***	***Dune***	***Barrier***	***Saltmarsh***	***LSCSF***
New coastal (hard) armoring of sediment source w/o nourishment	-2.0 (Ba) -1.5 (D) -0.5 (D) -1.0 (Or)	-2.5 (Ba) -1.0 (E) -1.0 (Or)				-2.5 (Ba) -1.5 (E)
Reconstruct (hard) armoring of sediment source w/o nourishment	-0.5 (Ba) NI (F) -0.5 (D) NI (F) -1.0 (F) -1.5 (H2) NI (F)	-2.0 (F) -1.5 (T) -1.0 (H) -1.0 (Or2)		-3.0 (T)		
New armoring (hard) w/nourishment	-2.0 (E4) -1.5 (W2) -2.5 (W)	-1.0 (E4) -0.5 (W) -1.5 (W) -3.5 (W)				
Reconstruct (hard) armoring w/nourishment: no nourishment previously req'd	-2.0 (W)					
Reconstruct bulkhead	NI (M2) NI (Bo)		NI (P)			
New house solid foundation	BZ:NI (Ba6) BZ:NI (H) BZ:NI (M3) BZ:NI (Or) BZ:NI (Br) BZ:NI (E) BZ:NI (Bo4) BZ:NI (Or11) BZ-0.5 (T2) BZ:NI (W4) BZ:NI (Y3)	BZ:NI (Ba2) BZ:NI (Bo) BZ:NI (Y)	-2.5 (D) -6.0 (T2)	-2.0 (T) -1.0 (T)	BZ:NI (Or4) BZ:NI (Ba) BZ:NI (Bo) BZ:NI (Y2)	NI (Ba7) NI (H2) NI (Bo3) -1.0 (Or) NI (Or)
New house pile foundation			-6.0 (Ba) -4.5 (T)	-4.5 (Ba) -2.5 (T)		-2.5 (Ba)

Figure 8. Sample list of permitted activities and activity ratings by coastal landform

well. For example, there were four projects in Eastham in 1999 that were allowed to be armored, with a nourishment requirement. Wellfleet had two projects that were rated –1.0 and -1.5. Wellfleet also had another armoring project that was rated –2.5. So you can see that there was qualitative judgment here as Graham had mentioned based on the degree of potential impact. Basically, judgment was based on the volume of sediment that may have been eroded out of that particular bank or its location within the coastal landform system.

What I did next was after having tallied all the ratings, I decided that it would be worthwhile to look at those activities that received negative ratings from all towns for specific activi-

ties. I then generated another table of these projects and established a table included in the appendix of the report.

For example, there were four permitted projects for new coastal armoring of a sediment source coastal bank without a nourishment requirement, and all were rated negative. There were secondary impacts to beaches due to the loss of source material, but what we were primarily interested in was what we are doing to the beneficial function of the landform where the activity is actually

Identification of Coastal Landform Affected by Permitted Activity & Rating

Cape Cod COASTAL LANDFORM SYSTEM SUSTAINBILITY PROJECT: 1999

	Affected Coastal Landforms						**Summary rating based on project responses** (NI = no impact) (BZ: buffer zone)		
ACTIVITY	***Bank***	***Beach***	***Dune***	***Barrier***	***Saltmarsh***	***LSCSF***	***Pos***	***Neg***	***Comment***
New coastal (hard) armoring of sediment source w/o nourishment	**neg**	**neg**				**neg**		**Neg**	
Reconstruct (hard) armoring of sediment source w/o nourishment	**neg**	**neg**		**neg**				**Neg**	
New armoring (hard) w/nourishment	**neg**	**neg**						**Neg**	
Reconstruct (hard) armoring w/nourishment: no nourishment previously	**neg**							**Neg**	
Reconstruct bulkhead	**NI**		**NI**						**NI**
New house solid foundation	**BZ**	**BZ**	**neg**	**neg**	**BZ**	**NI**		**Neg**	**BZ:NI**
New house pile foundation			**neg**	**neg**		**neg**		**Neg**	
Addition/expand house (motel,etc) solid foundation	**BZ**	**BZ**	**neg**	**neg**	**BZ**	**neg**		**Neg**	**BZ:NI**
Addition - pile foundation			**	**		**neg**			** + & -
Elevate existing house on piles	**BZ**		**	**					** + & -
Rebuild building (no exp.)	**BZ**	**BZ**	**neg**	**neg**	**BZ**	**NI**		**Neg**	**BZ:NI**
Relocate structure (e.g. house)	**NI**			**neg**	**BZ**	**pos**			**Depends on direction**
New septic (subsurface)	**BZ**	**neg**	**neg**	**neg**	**BZ**	**- & NI**		**Neg**	
Septic upgrade (subsurface)	**BZ**	**neg**	**neg**	**neg**	**BZ & neg**	**neg**		**Neg**	
Replace septic (subsurface)	**BZ**	**NI**	**NI**	**neg**		**NI**			**NI**

Figure 9. Examples of permitted activities that received negative or no impact ratings

taking place: that was most important. So I tallied up the types of activities that got negatives across the board in all communities for all projects and they are listed here on this table **(Figure 9)**.

But interestingly enough, we also see other categories of projects received both positive and negative ratings for the same activity but in different communities. For example, an addition to an existing dwelling on a pile foundation in a dune. There were three that got negatives and there were three that got positive ratings. The questions were answered based on *existing* site conditions, so that if the site was already altered or being used extensively and the resource was already degraded to a point where elevating the house would assist the landform in providing its beneficial function, it would have gotten a positive rating. If the landform was naturally functioning, and you were eliminating or diminishing that natural function, then chances are it got a negative. So, there are some activities that were rated negative across the board, and there are other activities that received a plus or a minus. These type projects that received both positives and negatives are going to play an important role in our mock hearing this afternoon.

For example, a new, elevated walkway down a coastal bank as shown here shows that there were eight projects that were rated as no impact; six projects that were rated positive; and, four projects that were rated negative. I wrote a short description of why these ratings were made on these different activities in a section of the study report. For example, a new walkway down a coastal bank, the ones that received a positive were probably ones that people were already using and impacting the bank. They were walking down the bank and destroying the vegetative cover as a result of the pedestrian traffic, creating gullies, and increasing the erosion of areas of these vertical buffer banks. But from this table you can see that a lot of them got negatives and positives.

New elevated walkways over a dune received one positive and six negatives, and one no impact. There were four at-grade dune walkways permitted. They were all rated as negative. Now, if people had already been walking on the dune destroying the vegetative cover and possibly causing a blowout, and they put an elevated walkway in, that probably would have gotten a positive rating. So, existing conditions and prior use impacts played a large role in the rating.

There were 12 elevated marsh walkways or catwalks permitted on Cape Cod. All of them received a negative rating due to potential impacts to vegetation and the peat substrate.

Beach nourishment and bank nourishment with vegetation all received positives. There were seven beach nourishment projects permitted in 1999, and they were considered a positive or an enhancement to the beneficial function and the critical characteristic of that particular landform.

And lastly — I'm pointing these particular projects out because you're going to see them again soon —, there were 11 projects stabilizing dunes with plants rated positive. There was only one stabilizing a bank with plants, and it actually got a negative. Again, this was more than likely an eroding coastal bank. It would be a temporary impact in my opinion, but by stabilizing a bank that was supplying material to a beach, it would have slowed the erosion of that bank, diminishing the sediment source material to other landforms. Obviously, under storm conditions, more than likely the material would have been eroded and deposited on the beach anyway.

So what we did next in the project is we summarized the entire ratings to answer the question, "how are we doing in managing our coastal landforms"? Are we adding to or are we detracting from the beneficial functions of our coastal landforms, particularly on Cape Cod, and only for that snapshot of 1999?

This is the summary table for the entire project **(Figure 10)**. And as you can see on this table, throughout the project, there are a lot of positives, there are a lot of negatives, but the cumulative summary of all the activities in all the communities on Cape Cod, the grand totals based on 318 Orders of Conditions issued in 1999, are shown on here **(Figure 10)**. And as you can see in the totals, every resource area has a cumulative negative, which suggests that we are not maintaining critical characteristics or the beneficial functions of our coastal landforms, that is, the natural evolution of our coastal landforms. So, to look at this summary table and suggest that we are not maintaining the beneficial functions of coastal landforms is accurate.

However, I would suggest that we can't leave that statement as a stand-alone statement. Most of the people that I talked to suggest that the societal will to prohibit all activities on all coastal landforms is not there and may never be. Therefore, what we need to do, and as Karl articulated in his book, is to explore and analyze successful compromise solutions that will allow us to maximize the beneficial function of the coastal landform, perhaps while allowing certain activities to

TABLE 3: Grand Total Ratings for Orders of Conditions Analyzed in 1999

Cape Cod COASTAL LANDFORM SYSTEM SUSTAINABILITY PROJECT: *GRAND TOTALS*
(all Orders of Conditions Analyzed in 1999)

TOWN	**# of OOCs rev'd 1999**	***Bank***	***Beach***	***Dune***	***Barrier Beach***	***Salt marsh***	***Coastal Flood plain***	**# of projects in buffer zone (BZ)**
Barnstable	**82**	**-3.5**	**-4.5**	**-26.0**	**-17.5**	**-17.5**	**-15.5**	**(31 BZ to bank)**
Bourne	**21**	**NI**	**NI**	**(no proj)**	**- 3.0**	**+2.5**	**+/- = 0**	**(6 BZ to bank)**
Brewster	**10**		**-1.5**	**+10.5**	**(no proj)**	**(no proj)**	**(no proj)**	**(3 BZ to bank)**
Chatham	**5**	**-1.0**	**+/- = 0**					**(no BZ projects reviewed)**
Dennis	**7**	**-1.0**	**+1.0**	**-2.5**	**(no proj)**	**(no proj)**	**(no proj)**	**(no BZ projects reviewed)**
Eastham	**17**	**-1.5**	**+2.0**	**-0.5**	**(no proj)**	**-4.0**	**-1.5**	**(6 BZ to bank)**
Falmouth	**16**	**-2.0**	**-2.0**	**-3.5**	**-2.5**	**+1.5**	**-1.5**	**(1 BZ to bank)**
Harwich	**22**	**-3.0**	**+6.0**	**-2.0**	**No proj**	**-2.0**	**-1.5**	**(9 BZ to bank)**
Mashpee	**13**		**(no proj)**	**+4.5**	**(no proj)**	**(no proj)**	**NI (1 proj)**	**(6 BZ to bank)**
Orleans	**46**	**-1.0**	**-2.0**	**NI (1 proj)**	**(No proj)**	**NI (1 proj)**	**-2.0**	**(27 BZ to bank)**
P-Town	**6**		**+3.0**	**-2.5**				**(no BZ projects reviewed)**
Sandwich	**18**		**-3.0**	**-9.5**	**-7.5**	**+1.5**	**-2.0**	**(2 BZ to bank)**
Truro	**16**	**-4.5**	**-3.5**	**-16.5**	**-14.5**	**-1.5**	**-0.5**	**(2 BZ to bank)**
Wellfleet	**27**	**-7.5**	**-12.0**	**+4.5**	**No proj**	**-2.5**	**-2.5**	**(8 BZ to bank)**
Yarmouth	**12**	**-0.5**	**+5.5**	**+7.0**	**+4.0**	**-3.0**	**NI**	**(8 BZ to bank)**
GRAND TOTALS	**# proj 318**	**bank -25.5**	**beach -11.0**	**dune -36.5**	**barrier -41.0**	**marsh -25.0**	**LSCSF -27.0**	**+ sustaining landform system - not sustaining landform system**

Positive (+): sustaining the beneficial functions of the coastal landform system
Negative (-): not sustaining the beneficial functions of the coastal landform system

Figure 10. Grand total ratings for all permitted activities in all towns on Cape Cod in 1999

take place on these landforms to allow people to use and enjoy their property.

That's really one of the primary reasons of getting you folks together here is to explore the question, "*how* can humans and coastal landforms co-exist"? Not necessarily can they, but *how* can they co-exist.

So I'm going to leave you with this question for the remainder of the day. And the question is: "Based on this analysis and based on your own vast experiences dealing with coastal landforms in Massachusetts, have we arrived at the optimal balance of compromises that will allow us to maximize the beneficial functions of these landforms while allowing people to use their property"?

The remainder of the presentations for this morning, after the break, are going to talk about selected issue areas, basically the ones that I just highlighted on those tables in preparation of us having this discussion this afternoon, not only in the Mock Conservation Commission Hearing, which was designed around many of those issues I just spoke about, but for the open discussion this afternoon, to discuss whether we or are we not maintaining an optimal balance. And if not, how can we do a better job. And that was the main reason of trying to get this talent together that we see in this audience today.

So I'll leave you with that thought, and I think we have time for questions.

MS. HAMLYN: Can I ask a question, Jim? On your rating on positive and negative and the number you gave it, was that you applying the rating as one individual to all 318 projects?

MR. O'CONNELL: No, the conservation administrators, agents, and the natural resource officers in each of the 15 communities on Cape Cod actually did the ratings themselves.

MS. HAMLYN: So were they given some sort of standard? Because one person's negative two might be another person's positive one. So I was just wondering how valid the numbers are in the analysis, if they were all totally subjective.

MR. O'CONNELL: That's a very good question. She was wondering if they were given a standard by which to rate these projects. No, they were not. It was determined, number one, that if we were to select people to rate these projects the most appropriate people we thought were the people who had the experience of going out and seeing a broad variety of these type projects in the field, talking with the consultants, talking with the homeowners, talking with environmentalists. We determined that conservation commission agents and administrators were probably the most appropriate to do this.

It was a subjective rating. Not only was it a subjective rating, but it's also based on site-specific characteristics. And I think, as you all know, a walkway down a coastal bank in one area would probably have a different level of impact than a walkway down a coastal bank in another area.

Armoring a coastal bank, for example, on a bank that's providing only a very small volume of material versus armoring the Cape Cod National Seashore would obviously result in a different rating. So the ratings were subjective based on whom we thought had the most appropriate background to be able to rate the project. And again, a lot of those were very site specific and based on existing site conditions. Again for example, somebody already walking through a dune system

had already destroyed the vegetative cover verses an undisturbed dune. So it was based on site-specific conditions as well. So, it's a subjective rating.

MS. HAMLYN: By multiple parties?

MR. O'CONNELL: By multiple parties, right. Each agent in each community answered their own questionnaires. We can revisit it though. I have all the data, so if we want to revisit the numbers and the questions from another perspective —

MS. HAMLYN: It would just be interesting if it was standardized, to see what the comparison would be.

MR. O'CONNELL: If you have a suggestion on how to standardize it, I would be wide open, as well was all us who worked on it.

MS. HAMLYN: Well, maybe if it had been done by one individual's subjectiveness as opposed to multiparties, that would be interesting to compare, too.

MR. O'CONNELL: Yes. What we did was in 1998 with the towns of Falmouth, Truro, Eastham, and Brewster, was to run this project as a pilot project to test the questions. Number one, to decide on the questions, and to try to determine if there was a way we could standardize it. And this was the best that we came up with. Jane?

MS. HARRIS: Jane Harris from Chatham. I'd like to modify your answer to that question slightly, because as one of the people who performed that analysis, I felt that it was important for us to go back to the critical characteristics of the landform and look at whether it was maintained, you know, based on the site specificity as well as what we had seen in previous activities. So I think that it was a little bit more science-based valuation than just a subjective response.

MR. O'CONNELL: In other words, you felt as if you were looking at what the critical characteristics of the landform was?

MS. HARRIS: Yes, characteristics as identified in the Wetlands Protection Act for the resource area, and then, that, combined with the site specificity and past experience. So I think it was a little more grounded.

MR. O'CONNELL: Does that make you more comfortable?

MS. HAMLYN: Well, again, it's multiple — I mean Jane might have applied that standard. I'm not saying that everybody didn't do the best they could. It's just that — it's just interesting that it's that much variation. It's just interesting.

MR. O'CONNELL: Okay. Steve?

MR. BLIVEN: Steve Bliven, UMass Boston. Was one of the results of this any sense as to whether these negative impacts had to do more with inappropriateness of the Orders of Conditions or insufficiency of the regulations or some other issue? Why did projects come up with negative ratings, I guess, given the standards that exist in the Wetland Protection Act?

MR. O'CONNELL: That's an interesting question, Steve. What we were doing was trying to look at it from a pure critical characteristic sense. There are activities that are explicitly allowed in the Wetlands Protection Regulations that actually have — that were identified as having adverse

impacts.

For example, armoring of a coastal bank. There's no question in my mind that when you put armoring up against a sediment source coastal bank, you've eliminated its critical characteristics, which is its ability to erode. That is explicitly allowed under the grandfathering clause in the regulations to protect structures that were built before 1978.

Elevated walkways down banks and elevated walkways over dunes are actually encouraged in the regulations because of the alternative. The alternative would be that people are going to walk down the bank and people are going to walk on dunes anyway causing impacts. So they're actually encouraged to build these walkways, even though they may, in certain circumstances, have some impact, particularly perhaps to the vegetative cover, depending on its orientation and it's elevation and so forth, but perhaps less impact.

So, while we did see negatives there, we must also think of the alternative that may occur if you don't allow a specific activity to occur under a permit, which could be worse or have more of an adverse impact. Jude?

MR. WILBER: Jude Wilber, Falmouth Planning Board. Further, to just comment on Steve's comment. I agree. It seems to me that by introducing these standards to evaluate decisions, you brought new standards in. You're not using compound standards. You developed a series of standards in your questionnaire, for the — really from the geologic processes and products along the mobile sedimentary shoreline, rather than to vegetative maintenance or the static inventory or birds and flowers.

It has been my observation that most conservation commission regulations will incorporate that into their decision. So therefore it's not surprising to me that by imposing an outside standard that's heavily weighed toward the fact that an eroding bank is a very good thing because — surely because of the sedimentary shoreline that, of course, conservation commission decisions are coming out negative in that regard.

MR. O'CONNELL: I hope that you'll have an opportunity to bring some of those issues up in the hearing this afternoon. But the hearing was designed around specific activities that I had seen that got positives and negatives, not necessarily the ones that all got negatives and all positives. The mock hearing project was designed around the pluses and minuses. So you may have an opportunity to discuss that with your group.

But again, I feel like I should repeat a little of what I answered previously, which is, you've got to also consider what the alternative may be if you don't allow a particular activity to take place. And I guess the simplest example is a pile-supported boardwalk over a dune. If you're not going to allow a pile-supported boardwalk over a dune in an area that is heavily used by pedestrians, then you're going to end up with loss of vegetation, gullying, potential blowouts and potential artificially induced overwash of that area. So there are tradeoffs and balances in performance standard-based regulations, and I think that's really the charm of a performance standard-based regulation. It allows you a little flexibility to think about what potentially a more adverse impact may be, and

then modify your conditions to accommodate maximizing the beneficial function. Les?

MR. SMITH: Les Smith, Epsilon Associates. Jim, did you have a chance to take a look at the extent of alteration or the extent of development? Had it already occurred for each of these? I'm just kind of curious. Was it already existing before the Order of Conditions was issued in each instance?

MR. O'CONNELL: In other words, are you suggesting that the activity already took place before it was permitted? My answer is No.

MR. SMITH: For example, in some cases, we're dealing with an already developed barrier beach versus one that was partially developed. Did you look at the different conditions along the shoreline? I'm curious about that.

MR. O'CONNELL: The question was, did we look at different conditions. In other words, oftentimes decisions are based on site specificity. And his example was an already heavily developed barrier beach. What pops to mind is Nantasket Beach in Hull, for example. You can't even see a dune in the middle of this heavily developed barrier beach anymore. Did we take into consideration the site specificity of the alteration of the landform already? I think that was what was reflected in the rating scheme itself. I would use a hypothetical example again, which I mentioned just a minute ago, which was armoring the coastal bank of the Cape Cod National Seashore versus armoring an eroding coastal bank that's relatively stable already. The volumes of material would be much different. That was a subjective rating. But if I asked you to rate between 0.5 - 3, armoring a seashore bank or armoring a bank in Bourne, if you were to rate that, I would suggest you'd probably come up with less impact rating for Bourne than you would with the seashore. Does that answer your question?

MR. SMITH: It helps.

MR. O'CONNELL: I think they took in the site-specific nature by giving it the rating, from 0.5 to 3.

MS. MONTOURIS: Dorothy Montouris, DEP. I would sort of echo, the self

grading. I don't know how — how you can't escape sort of subjective review of your own actions in grading those, the Orders. But I also extend it to the department (DEP) in seeing exactly what the effects of our permits are. But it would be helpful to have somebody come in and do that sort of from a neutral position.

MR. O'CONNELL: To have a group?

MS. MONTOURIS: Yeah. I think that's a more — I would probably trust the results better in terms of somebody coming in and taking a look at that. I think it's just for appearance sake, but also to accept the objective standards that everybody's agreed upon going in. Because I think self-grading can sometimes bring forth questionable conclusions.

But my second question is, in hard solutions, do you include durabags, or are they considered soft solutions?

MR. O'CONNELL: We considered geotextiles, such as durabags and geo-tubes, as hard structures.

I do want to respond, again, to the subjectivity question of the rating scheme itself, as was

raised, which I anticipated it would. It was relatively subjective, but I would like to take anybody in this room and show you a picture of a project, and then ask you to answer one of the questions, because I think the questions were pretty specific. For example, will this activity impede the erosion of sediment from a coastal bank? And if so, then you have diminished or eliminated its critical characteristic. To me, that's pretty clear.

Will this activity destroy the vegetative cover of the dune? A pile-supported boardwalk may or may not, but there are other activities that are clearer — a pile-supported house in a coastal dune, for example. I have not seen a pile-supported house on a coastal dune not destroy some vegetative cover of the dune, particularly in the central portion under it. So if you were asked, will a pile-supported house destroy the vegetative cover of the dune, can anybody here answer that question other than in the affirmative?

(No response.)

So, I guess, in my opinion, yes, the ratings, the negatives and the positives, were subjective, but I think the questions themselves, in my opinion, were very pointed and very clear. And if that's not the case, I'd love to hear an example of where those questions weren't clear.

MS. MONTOURIS: I guess my personal experience with questions that appear very straightforward with appeals have very different answers or opinions as to what the end result of that particular activity is. That's why I think the commission that issues that order, you know, obviously issued it in good faith and believes these are the effects and not defects. And I just think in terms of an objective study, you'd have somebody that's outside of that process that you're looking at. That's just my personal opinion.

MR. O'CONNELL: One of the recommendations in the report — in addition to a couple of research items — was to go into the state's superseding Orders of Conditions and do the same evaluation. We didn't have time to do this. And perhaps for those we should get a group together.

MS. MONTOURIS: That would be great. I think they should be looked at well, really, across the board because we're all doing the same thing. I mean, we all look at impacts to resource areas, so I think it's valuable to the state and local people.

MR. O'CONNELL: The original plan was to look at the superseding orders, but to get the conservation agents to take the time to come to these meetings and answer questionnaires, in addition to their many responsibilities that they have now was not easy, and the time that they spent on this project is very much appreciated. David?

MR. LYTTLE: David Lyttle, Ryder and Wilcox. To get away from the subjectivity, but talk about the ratings, shouldn't you perhaps rate the alternative? I mean, the alternative might be nothing, and in some cases, you should perhaps rate, if it's site specific, what the alternative will be if nothing is allowed there. Where would the rating of that fall into the same scenario? Because I think that becomes an important part in the whole process.

MR. O'CONNELL: Yes, and it does. And again, a pile-supported boardwalk

over the dune. You know, if you don't allow that, the alternative may be worse.

MR. LYTTLE: Do you think that's something that should be looked at as well?

MR. O'CONNELL: Yes and no. And I say no for this reason. We are guessing what the alternative may be. If we don't permit the pile-supported boardwalk on a marsh — and this came up in discussions during the project — if we don't allow a pile-supported boardwalk on a marsh, there were two responses. One was, it's going to discourage people from walking on the marsh because most people don't want to walk through the marsh grass or on the marsh. So it'll probably discourage the use of the marsh. Whereas, there was another whole school of thought that said, if we don't allow this pile-supported boardwalk on that marsh, people are going to walk on the marsh and destroy the vegetation. So it still is questionable — we're on both sides of the spectrum.

MR. LYTTLE: The rating is — as people are saying somewhat subjective, so I think you should still have that. Very often projects are denied, and I think that should be part of the same consideration.

MR. O'CONNELL: Perhaps we can do this again. This was just a snapshot in 1999. And we discussed all these issues and did what we could, but we can always improve it. Rich?

MR. ZINGARELLI: Rich Zingarelli, from the Department of Environmental Management. Jim, I notice, and you mentioned right up-front, that you looked strictly at Orders of Conditions that were issued. Do you think there also is kind of negative bias in the fact that activities that would require an Order of Conditions would tend to be those that would be negative, whereas there may be a realm of activities in the areas that would not require Order of Conditions and might tend to be more of a positive activities?

MR. O'CONNELL: Can anybody answer the question of what activities do not require an order.

UNIDENTIFIED VOICE: Planting in a dune, that would just be an RDA (Request for Determination of Applicability).

MR. O'CONNELL: In some communities, yes. I think there are some communities who require an order for that activity.

UNIDENTIFIED VOICE: Or even sand fencing can be done with an RDA in some communities.

MR. O'CONNELL: In some communities, right. And other communities will require a full review and order of conditions.

UNIDENTIFIED VOICE: But you only reviewed orders, so you didn't get to tally in RDAs — that's a good point.

MR. O'CONNELL: We didn't review RDAs, we just did Orders of Conditions. Bruce?

MR. TRIPP: Bruce Tripp, Woods Hole Oceanographic Institution. In terms of the objectivity of this report, it seems like you would look for — if you're looking for a neutral body to assess — make an assessment of these regulatory decisions, you would look for highly-trained, highly-skilled, and personally knowledgeable people. And you had 18 of them listed on the screen. If you were looking at a statewide survey of experienced coastal landform people, you'd probably pick from that same group of highly-skilled people. And even though they were assessing their own town's decisions, some are strongly negative, so they were not interjecting a bias of defending

their own decisions in any way. And you have the performance standards in the state regulations. And you have a preamble to each one of these resource areas in the state regulations. And all of those people you know were using those standards. So your search for a neutral standard is in your study. So I think that I would prefer to see a mixture of people doing this survey in the way that you did it than have one single person trying to be totally objective, because I think with the site specificity so variable, you would fail on that account. So I think I trust these results. Yes, we could always do it better, if we magnified the budget and magnified the time, but I think given what you tried to assess, I think the results are very viable.

MR. O'CONNELL: Thank you. Bob?

MR. FULTZ: Bob Fultz, I'm a consultant mostly for municipalities. I was just wondering. On your table, Jim - I haven't read the report — I was just wondering, did you have restoration projects in there, you know, beach nourishment or dune rebuilding?

MR. O'CONNELL: Yes.

MR. FULTZ: They were introduced?

MR. O'CONNELL: Yes. There were 46 separate activities that were permitted, that is, individual, specific activities that were permitted. And there were dune restoration projects, beach nourishment projects, primarily as a result of dredging inlet channels with compatible materials. And they enhanced — they were, for the most part, given positive ratings as enhancing the volume of the beach or dune. It's one of the questions on the questionnaire, will the project decrease or increase the volume of sediment of the beach or dune. The nourishment projects and the dune restoration projects generally got positives. Carlos?

MR. FRAGATA: Carlos Fragata, DEP. My feelings actually go the other way. This is a personal opinion now. I want to know how many of those projects you looked at and how many you agreed with. That has more value to me at this point because there's such variability. Based upon your knowledge, were you involved with all decisions?

MR. O'CONNELL: I did my best to stay out of the rating and the decision. What I did was I went on-site with the agents on a number of these projects, and basically just explained my opinion on how the landforms were functioning and interacting. I was basically acting as a technical resource, as a coastal geologist, to just insure that — to just give my opinion on how I thought the landform was functioning. I tried to stay out of the ratings as much as possible and leave it in the hands of the agents themselves for consistency.

MR. FRAGATA: In your opinion, do you find that the study mimicked your hypothesis? You know, did it pan out that these agents were looking at things and coming up with the same consistent approach the way you were?

MR. O'CONNELL: Yes. My personal opinion is I think they did a tremendous job in trying to stay right down the middle and keeping their biases out of it. We had many discussions, many group discussions, and in my opinion, I think they did an outstanding job in trying to maintain neutrality, trying to maintain not factoring in their own personal biases. I actually applaud them

for doing that.

Yes, I had my own opinion on every project all along. Sometimes I articulated it, but I tried to allow the process to take place on its own.

MR. FRAGATA: So to answer the question, did you feel that they rated it the same way you wanted them to rate it?

MR. O'CONNELL: No, I knew — I pretty much knew that most of it was going to come out negative because any activity on a landform is going to affect it. I appreciate Karl's presentation because I think now we recognize that human beings are intrinsic to the evolution of coastal landforms, and I think we have to perhaps start thinking in those terms, but only in specific areas of coastal landforms and certain activities. What I'm hoping to get out of this day is what are those specific landforms or areas of landforms. Foredune areas of a barrier beach, for example, have already been identified as one of the key, critical areas of the landform system. And we've identified that and prohibited certain activities like septic tanks and so forth.

MR. O'CONNELL: This is great. The report is available through the WHOI Sea Grant Office: The Coastal Landform System Sustainability Project: An Analysis of Activities Permitted on Coastal Landforms on Cape Cod in 1999. I'm here, as well as all the project participants. People are still raising their hands for discussion, so we'll have to continue the discussion at our break or at lunch.

Let's break and we'll begin the next session in 15 minutes.

MR. O'CONNELL: In this session, we're going to have some of the Coastal Landform System Sustainability Project participants, the conservation agents and administrators in four of the 15 towns, present case studies. These case studies, as well as the previous discussions this morning, are preparing you for the Mock Conservation Commission Hearing this afternoon, which I'm sure is going to be very enlightening, if not entertaining.

Rob Gatewood, the Conservation Administrator for the Town of Barnstable, is going to moderate this session, so I'm going to turn it over to Rob now.

MR. GATEWOOD: Thanks, Jim. It's my privilege to introduce the presenters in this case study section of the program.

First up is Mr. Henry Lind. Henry has served as agent for the Eastham Conservation Commission since the passage of the Wetlands Protection Act in 1975. His role as agent is part of the Department of Natural Resources, which also includes such activities as shellfishing management, harbormaster, and occasional marine mammal strandings coordinator, among others.

His education includes undergraduate studies at Boston College in Biology, and graduate work in Biological Oceanography. Henry's topic is going to be Armoring Coastal Banks. Please join me in welcoming Henry Lind.

ARMORING COASTAL BANKS

Henry Lind, Natural Resources Officer, Town of Eastham

MR. LIND: Thank you, Rob, and good morning.

Just briefly, before we get started, I was one of the individuals who was chosen by Jim and Graham to be a participant in the project evaluating how the regulations are — or how the landforms are being sustained. And I'd just like to carry – pick up without beating a dead seahorse, the concept of the theme that we had, which was how did this work, and how did it go, and what was the objectivity of it.

Perhaps the one characteristic that the group of us that initially started in '98 wrestled with continuously was how do we ask the right question and how do we get the same answer. What we were not trying to do was to write a report card for the DEP. So that was not the concept. The issue was how are our landforms surviving the onslaught of all of us. And as Rob pointed out, I've had the pleasure of working with a variety of different conservation commissions since the Wetland Protection Act was established. It is, as you all know, the first line of review for all of the regulations. It is volunteer, and they are well paid by the intrinsic value of their service to the community.

It's been a pleasure to work with all of them, but very few come to the table with an actual un-

derstanding of any of the wetland resource issues, much less specifically coastal geology. And it's largely a matter of pulling out the performance standards, pawing through the pages, what does this say, what does it mean, how have we handled it in the past, and what's the best strategy for approaching it in a compromised understanding that it's not a perfect world.

Bear in mind the age-old expression: Two things that you do not want to see made are sausage and legislation. And legislation is a grizzly, grizzly task.

We have evolved; we've metamorphosed, I guess, if you will. Personally, I evolved, as we pointed out, I'm a biologist, so listening to Dr. Nordstrom this morning, I was very gratified to see that he has colleagues in the biological sciences who are thinking about the same issues in sort of the same fashion that I am. I'm fortunate to have the expertise and the guidance of a variety of other people to help us with understanding that.

But what we're going to look at in the next few minutes is the evolution of the process in Eastham, to this evaluation of, well, how are we doing? And as Graham said, our answers are becoming questions. We thought we had all the answers in 1975, when the legislature passed the statute and the 310 CMR came out. We're nowhere near that. We're working on it, but we're nowhere near complete.

(Slide presentation)

So, with that, we have to — in the topic of how are we co-existing between coastal banks and beaches and humans, the two issues, of course, are the forces of erosion, what makes it happen, and the compromise of the utilization of this near bank area for housing. And in Eastham, we have two scenarios. Cape Cod Bay is heavily developed. It was developed as early as the late 1920s in the idyllic sense of let's have a house at the Cape. In contrast, we have the backside, which has the Cape Cod National Seashore. Time was frozen in 1965. No further development happened. We have a wonderful laboratory essentially on both sides of the Cape to which we can compare. Standards are not exactly the same. The rates of erosion are different, the dynamics are different, but essentially we had the opportunity to look at both kinds of scenarios.

And here's the idyllic, quintessential Cape Cod beach. Not unlike the other beaches that we've seen. Children playing in the water, umbrella, coastal bank supplying sediment to this lovely wide beach. You will note that there is quite a lot of seaweed, detritus. We have an ongoing battle with some of the folks who would prefer to clean the beach, and so far we've had the opportunity to be successful that they're not going to do that. And as a matter of fact, we've got one project that demonstrated how effective this rack line is in actually trapping sand. And we worked with a school group that did the calculations and figured out how much sand would have been lost to the system had we had a perfect beach.

On the other hand, then we have this other stretch of beach which represents that part of Eastham that has experienced near-shore development. There are cottages that are fairly close to the top, and the evolution of shoreline protection strategies has resulted in guess what? Here's the tide. Where's the beach? The recreation platform, is a lovely term, is established right here at the

top of the coastal revetment. And, in fact, in many cases we'll see the picnic tables and the lawn chairs set up there. The tide arrives about two hours before high water and departs two hours after, and swimming is done essentially jumping off the set of stairs.

And this, of course, is the reason. Your option is to have this house in a bunch of splinters, or to protect it with some kind of an armoring structure.

So with the commission and the regulations, we say what makes a beach tick. And obviously, each beach is different. We're going to be talking quickly about the Cape Cod Bay landform, and it has about four-foot storm tide wave elevation. It's not horrendous. We have about an annual rate of erosion in the neighborhood of one foot per year. That's based on various erosion surveys. We have the littoral drift in Eastham, creating our barrier beaches. And I did pick this particular format for the design of our power point here. That's the river of sand. That is the littoral drift of sand in Eastham from one area to another.

We have tidal flats that are supplying huge amounts of sand for aeolian transport. We have two protective structures, one to the north called Jeremy Point. It's a peninsula, which provides protection from the northwest winds, and that covers about, roughly, the northern half of town, exposes the southern half of the town to northwest winds, and, of course, the littoral drift proceeds from north to south. The southern part of town is protected by the glorious towns of Brewster down through Dennis. The fetch there is considerably reduced. Littoral drift, therefore, from the middle of town is toward the north because once you get beyond that, then the wind direction and speed is enough to drive the sand in that direction.

Ground Zero is a place called Campground. And it's called Campground because in the late 1800s it was established as a Methodist Campground. Schooners would come over from Boston and the participants would go ashore there and wander up into the areas for weekend stays. It was the beginning of the tourist industry, I guess. And as the post-war development continued, we have two-tenths or one-tenth of an acre house lots with cottages that are packed one right next to the other. Ground Zero is where both the northwest and the southwest wind come together, and the highest rates of erosion are right in the place where we have the highest density of housing. It's not a good situation.

This is our tidal flats region. A thousand yards or more of intertidal flats, as you can see, typically will dry out over the tidal cycle. When the wind blows, guess what happens? The wind picks up the sand and it drives it into the near shore area, and it gets redeposited on the banks, on the dunes, and elsewhere. As Jim said, remember this picture, it'll come back.

This is Ground Zero. This is a classic example of one of the houses that's built on one of the one-tenth of an acre lots, after a storm event that kind of did some damage. It's interesting to note that this particular cottage was actually moved here from a place called Billingsgate Island, which was rapidly deteriorating and being eroded into what is now a shoal. And it was hauled over here on a raft in the early '20s, in order to save it from destruction. At the time, they thought they put it far enough back. Well, it didn't quite happen.

Our historical approach to what do we do about this problem, given the regulations, in the engineering field started out with groins. There are several examples of those that were constructed in the '50s and '60s, the most dramatic of which is right on a barrier beach in the northern part of town, and which was very successful at starving the rest of the barrier beach. Our good friends at Audubon and the plover colony a little further to the north are wringing their hands and concerned about the issues there. We have proceeded past groins at this point. They're a thing of the past in at least our strategy.

The next stage was wooden bulkheads, and that was a pretty simple approach. You go down with your house builder, and you just build something that looks like a house, and of course, after the wave energy takes over, it doesn't quite work the way we had expected.

So in the early '80s, after four or five years of watching the wooden bulkheads disappear, the community decided, well, what we really need is some armoring. And so stone revetments were established, designed to the best of our ability, that being a cooperative effort between the engineering community and the regulatory folks, which is myself. And again, as time progressed in our evolution of thinking, Dammer's Law as invoked. Dammer's Law being that if some is good, more is better. So a 6-foot tall stone revetment ended up being a 10-foot wall that was then transformed into a 23-foot wall without the clear understanding that the wave reflection that was happening as a result of the increased size was actually shooting us in the foot.

And as you can see here **(Figure 11)** the evolution between the wooden structures into the stone proceeded at a fairly rapid pace. This is the 23 foot tall structure, and it is effectively protecting what we have for cottages. At the expense, of course, of the barrier beach or the coastal beach right in front of them.

Figure 11. Revetment constructed of stone riprap on a coastal bank

Can we say end effect? Yes, we can. And, of course, what happened was when Mr. Smith built his revetment, and the end effect started to occur on Mr. Jones' property, then Mr. Jones came in with his Notice of Intent, and following that, all of the neighbors down the line. In short order, we had about 2,000 feet of continuous stone revetment.

In the mid to late '80s, the commission and conventional wisdom, if you will, started rethinking this whole process, and the commission, in reviewing a number of new Notices of Intent for

stone revetments, said there's got to be a better method. And the engineering community suggested how about durabags, sandbags, or something of that nature. And that has evolved further into some other rethinkings of more passive solutions and more – less confrontational, if you will, including such things as sand-drift fences.

While the durabags were initially suggested as being resilient and non-reflective and a good alternative to the stone revetments in a variety of ways, not the least of which was the razor blade theory; and that is, when we decided that it really didn't work as well as we thought it would, we'd just go down there with a razor blade, we'll just cut the bag and it will just disappear, nourish the beach, and everything will be fine. That's still out there. We haven't had the opportunity to invoke the razor blade act yet.

Figure 12. Sand bag (geo-tube) revetment showing end-sour

One advantage is that you can still see that the rack line is fairly close to the toe of this structure. The wave reflection is absorbed somewhat in the bags. However, you'll notice that the mandatory sand cover on the bags is kind of missing, but the good news is that the wave reflection didn't get up high enough to disturb the vegetative cover on the top of it.

Can we say end effect **(Figure 12)**? Well, yes, we can. And it's becoming obvious that these are probably not the solution that we thought they were originally.

Figure 13. Sand-drift fence

The next stage in the evolution was the creation of a local engineer construction individual/ contractor, called a sand-drift fence **(Figure 13)**. It's a step above the snow fence. It is ruggedly built; it is sturdy. It is installed with the idea of capturing all of this nice sand that's out here that's blown in by the wind. And you can see directly behind it it is accreting, it is available to the waves when the storm event occurs. As you can see from this area here, that it brings the sand back down to the beach, provides the littoral transport that's necessary; and, in fact, when it's functioning the way it's supposed to function, actually accretes a little bit in front, revegetates, and works out well.

The final approach that we're using to the systemwide issue, in addition to what do we do with a new structure or a place, for instance, that doesn't have a structure to be protected by a revetment,

is that of let's add some nourishment to all of these structures. Based on the fact that nature is going to try and erode some of it, we might as well make it available, and we will do that.

So the quick synopsis of our regulatory approach, thinking about the system initially, we said, no, you can't do it. That didn't work. Then we said, okay, we're going to write you a 10-year order, and at the end of 10 years, you're going to have to pull it out. That didn't work either.

So we decided to think outside of the box and look at mitigation. And that is design modification, change the slope, change the angle, perhaps do some beach profile monitoring. For a few years we required the annual conditions that a profile would indicate whether the beach was disappearing as a result of this structure or not. That really is ineffective because of the subjectivity of the monitoring program, the beach itself, and then how do you identify whether one of this 2,000 foot long stretch of stone is actually influencing the beach, or is it the neighbor, or is it two neighbors down the road.

So we have ended up with the annual nourishment requirement for any new structure or any renewed structure. That puts the burden on the individual property owner to literally dump the sand into the tide, watch it go away but assist the whole system in an effort to try and continue to protect our barrier beaches and our coastal system as a whole.

How effective is it? Well, we've only been into it about three or four years. We have about 20 property owners who are required to do that. We have a wonderful clerk who is very friendly, but very firm. When the property owner calls up and says, you mean I've got to dump more sand on the beach, the answer is yes. And so far we've had quite good compliance. Our preliminary indications are that in many areas the beaches, in fact, are being supported by this, and the beaches are — the barrier beaches are getting healthier. In some of the other areas where they've had essentially zero beach in front of any of the structures, now they at least have a token of sediment. So we consider that it's heading in the right direction.

Co-existence then depends on a better understanding of the whole system. The fact that we're dealing with a dynamic region, as we heard earlier, and cooperative efforts, it's not an us/them kind of situation, everybody's in it. In the long term, we're going to have to all deal with it together, and with any kind of luck, we'll be able to figure out the ways to do that.

Do I have a minute for questions? I have no minutes for questions, so we'll see you at lunch.

NEW AND RECONSTRUCTED HOMES ON COASTAL DUNES

Mark Galkowski, Conservation Agent, Town of Sandwich

MR. GATEWOOD: Our next presenter is Mr. Mark Galkowski. Mark, from 1987 to the present, has been serving the Town of Sandwich as its Conversation Officer, its Shellfish Constable, its Herring Warden, its Oil Spill Coordinator, and as Special Police Officer. Mark holds a degree in biology from Providence College and pretty much has made a career of municipal service in the conservation area.

I'm happy that the town that I live in has a conservation administrator, and I'm real happy that that administrator is Mark Galkowski. Please welcome him.

MR. GALKOWSKI: Good morning.

I want to start off by going over the section of the regulations under 310 CMR regarding coastal dunes because I'll be talking about reconstruction of dwellings in coastal dunes, and some new construction. I think that's the best way to start off so we're all familiar with it.

(Slide Presentation)

Just a quick review for those who are not familiar with 310 CMR, the Wetlands Regulations, which are utilized to administer the Wetlands Protection Act. The section we're talking about are coastal dunes, 310 CMR 10.28. The definition of a coastal dune is any natural hill, mound, or ridge of sediment landward of coastal beach deposited by wind action or storm overwash. A coastal dune can also mean sediment deposited by artificial means, serving the purpose of storm damage prevention or flood control.

In the preamble, the regulations describe coastal dunes. All coastal dunes are likely to be significant to the storm damage prevention and flood control. Important in this particular talk is that in Sandwich most of the coastal dunes occur on barrier beaches. In a few cases, we have dunes outside barrier beaches, but what I'm talking about here today is mostly from barrier beaches.

All coastal dunes on barrier beaches are significant to storm damage prevention and flood control. Coastal dunes are also often also significant to protection of wildlife habitat.

And because coastal dunes, on the average, are higher than the bordering beaches, they aid in storm damage prevention by supplying sand to adjacent beaches, and protect inland coastal areas from storm damage and flooding by storm waves and elevated sea levels.

In the regulations, as you work down through them, you have something called presumptions of significance. For any review by any particular conservation commissions they're the first line of defense in reviewing projects. If the project involves dredging, filling, removing, or altering — just about any activity — in a coastal dune, the issuing authority shall presume the area is subject to the interest of storm damage prevention, flood control, or protection of wildlife habitat; that is, unless it's overcome by a clear showing on the part of the applicant that the coastal dune does

not play a role in those interests, and that the issuing authority makes a written determination to that effect.

Just to back up for a second. In the wetlands regulations, there are seven interests protected. These are three of them. And I don't want to cloud the issue with the others, but these are the three that deal with coastal dunes.

The other thing is that when a coastal dune is significant to any of the interests, the following characteristics are critical to the protection of those interests: the ability of a dune to erode in response to coastal beach and storm conditions, the dune volume, the dune form which must be allowed to change by wind and natural water flow, vegetative cover which provides stability, the ability of the dune to move landward, and the ability of the dune to continue serving as a bird nesting habitat.

And then lastly, applying the performance standards. When a dune is found to be significant to any of the interests, the performance standards found in 310 CMR 10.28 Section 3 through 10.28 Section 6 shall apply. And again, any alteration or a structure on a coastal dune or within a 100 feet of the dune shall not have an adverse effect on the dune.

The second section in Section 4 talks about accessory projects: sheds, parking lots, things like that, not necessarily the primary structure.

Section 5 deals with walkways. They'll be discussed in the next talk.

The regulations do not permit a project that will have an adverse effect on the habitat sites of rare birds of prey and other various species.

Figure 14. House elevated on open pile foundation

So that's basically the performance standards that we're working with.

Now, the other issue, when we talk about existing structures on barrier beaches, coastal dunes, or land subject to coastal storm flowage, when a project proponent comes in and has an existing structure and wants to make modifications to the structure, update it or whatever, there's something called a substantial improvement determination that needs to be made. A substantial improvement determination is a review of the cost of the alterations in relation to the market value of the structure. If those alterations equal or exceed 50 percent of the market value it requires that structure comply with the regulations. In the case of

the wetlands regulations, we're talking about elevation of that structure, typically, on a pile foundation or something similar to allow for the migration of the dune **(Figure 14)**. But in Sandwich, coastal dunes and barrier beaches often times fall within FEMA V, VE, A, or AE flood zones. The V zones, obviously, are on the front section of the beach, where you have wave action. And the A or AE flood zones are behind that, or typically flood from the estuary behind the barrier. The person that typically deals with the substantial improvement determination in FEMA matters is the local building official or building inspector.

In Sandwich, and I'm sure other towns, we've gone through various reviews of substantial improvement determinations and attempts by conservation commissions to do it, but realistically, it's the local building official who should be making that determination. He's got the authority under the FEMA regulations and the Massachusetts State Building Code. For the commission to do it, typically, it's a repeat action and it's spending a lot of time that's not necessary.

The information that's necessary to make that determination is provided to the local building official, including the total cost of all renovations, and house plans detailing the renovations. The applicant provides two certified independent appraisals detailing the value of the structure. That's submitted to the building inspector, and he goes ahead and makes that determination.

In the Town of Sandwich, as I mentioned, most of the dune activity where reconstruction has occurred is on barrier beach systems. We have three heavily developed barrier beaches. Two are on the Cape Cod side, one's on the mainland side. The Town of Sandwich is split by the Cape Cod Canal.

Interestingly enough, we also have an issue with the Cape Cod Canal. There's a structure, a jetty, that interrupts littoral drift of material that comes down from the Plymouth area. It's been an ongoing discussion with the Corps over the years, but the reality is that that structure interrupts that flow, and the beaches on the lower side are starved of sand.

Figure 15. Typical density of houses along the Sandwich shoreline

All different types of structures occur on these beaches. Mostly these were structures built post-World War II. Many of them were built as camps. I can't believe they fit so many people in these in the summer, but that's the case all over the Cape and any seasonal community.

And probably when they were built, they were typically washed away in the winter. You went down in the spring, rebuilt the structure, and this is what we have now **(Figure 15)**.

We even have some structures that I wouldn't consider habitable, and I don't think you folks would either, but, believe it or not, they rent these out in the summertime. And when we deal with renovations of the structures, this is sometimes what we have to look at. Septic systems for these typically are a 50-gallon drum in the ground.

Various types of expansions and renovations have occurred over the years: small structures made into castles. We see this all over the coastal communities today. And I lay that back on that substantial improvement determination. It is a very difficult process to follow through on because there are so many variables.

These are structures that were renovated in Sandwich prior to 1987. At that time, the building inspector was acting as conservation agent and the building inspector at the same time. In 1986 they had 680 building permits in the Town of Sandwich at that time for new homes. The building inspector didn't have the time to really work on these and advise the commission. It's not his fault, just the nature of the beast. I was hired shortly after that, and went back through and started working on them, making projects conform to the regulations and working with the conservation commission.

This is typically more like what we deal with today, houses on open-pile foundations **(Figure 14)**. It's more in conformance with the standards, but in some of these cases, these houses may not have been elevated quite enough.

Foundations that these structures are on today are similar to this, concrete blocks or old wooden posts. These are poured in the V zones. You can see they wouldn't withstand a storm today.

Then we have cases where people have gone ahead and made modifications to their foundations without permits, whether it be wetlands permits or building permits in cases. There's only so much you can deal with in the time you have. A lot of this work goes on on weekends, and so on.

Also, what we have are structures, again, on a densely developed barrier beach very close to that frontal dune.

As you can see, in some cases, you have houses that sit back further on the beach and those that extend right out to the top of the coastal dune.

As time has gone on, we've experienced various effects. As Dr. Nordstrom was saying, in dealing with the local community people are reluctant to change their ways. They've lived in those houses for years, maybe didn't experience storms, et cetera, or they're new owners, they're seasonal owners.

But following two storms, the No-Name storm of '91, and the December storm of '92, people began to realize, after substantial devastation in Sandwich - we lost up to 12 homes in those two storms - people down here began to realize that what the commission and I and the other officials have been talking about is a reality. So they bought onto the issue that if we're going to renovate structures go ahead and start following the performance standards for coastal dunes, like constructing on open-pile foundations **(Figure 16)**.

MR. GALKOWSKI: You can see open-pile foundations have a fair amount of space underneath

Figure 16. Coastal storm damage along Sandwich shore following the October '91 Nor'easter

that allows the sand to migrate, the dunes to move.

For additions its the same thing: construct on an open-pile foundation regardless of what the previous structure was built on. If there's no alteration to the main structure, if it isn't substantial renovation, it doesn't have to be elevated. So, only the addition is elevated over the dune.

Again, more typically what we're dealing with today, even small structures have been elevated.

With elevation of structures we begin to see vegetation. Adequately elevated, more than 24 inches as per the standards set by MCZM some years ago, we begin to see the vegetation migrating in these areas and help stabilizing the dune along the edges.

We've also experimented in some of the AE flood zones, the backdune areas, with concrete posts. These are typically cases where there is a hardship, where the structure cannot be moved, so the foundation had to be constructed underneath. We try to avoid these, but there are those cases where the commission has to allow concrete posts rather than a pile foundation, the preferred method.

Again, you can get adequate elevation with structures in the A zone, a minimum 24 inches over grade.

We've also experimented a little bit with helical screw anchors. This is something new. The manufacturer's made some modifications and they are no impact foundations. We don't have to bring any cranes on site or concrete trucks or whatever. Typically its a two-man operation to install these steel posts. You can see them there. That was for an addition to an existing structure.

As part of this renovation, one of the issues where there's a septic system that's involved that needs to be upgraded, we deal with elevated septic tanks. The standards call for no structures in the dune. Title V requires tanks to be elevated above the V zone. Again, we have overlying V zones on our barrier beaches and therefore we require elevated septic tanks. This is something we have been working with in Sandwich. I think this is probably some of the first gravity-fed systems that I've seen in Massachusetts. We have a number of them now. They're fairly high maintenance. They've got to be pumped out before winter. But it still meets the intent of the standards.

I'll cut it off there. Thank you.

MR. GATEWOOD: Thank you. Mark.

DUNE AND BANK WALKWAYS

Stephen McKenna, Co-Chair, Conservation Commission, Town of Brewster, and, Massachusetts Coastal Zone Management's Assistant Regional Coordinator, Cape Cod & Islands Region

Mr. Gatewood: Our next speaker is Mr. Steve McKenna. Steve has worked for Massachusetts Coastal Zone Management (MCZM) since 1997, and is the Assistant Regional Coordinator of the Cape and Islands office. Steve's a graduate of Bryant College, and of Massachusetts Maritime Academy, with degrees in Business Administration and Marine Safety and Environmental Protection. Steve is a licensed officer of the U.S. Merchant Marines. Prior to working for MCZM, Steve worked at the Buzzards Bay Project. Steve has been chairman of the Brewster Conservation Commission for the past three years. Steve's topic is going to be Dune and Bank Walkways. Please join me in welcoming Steve McKenna.

MR. McKENNA: Thank you. I'm going to try to keep this brief. I know we are behind schedule. A lot of what we have heard this morning is about the coastal landform sustainability in sort of a systemwide approach, a regional approach. We've seen what's gone on in some other states, and how other towns are dealing with it on a town basis.

I'm going to do just the opposite. I'm going to talk about it on a specific case study. I'll deal with one issue and talk about our commission's review of that project. The project developed a lot of interest and discussion amongst the commission with this, and raised a lot of interesting issues. I'll try to go over that review with you and talk about our review of it relative to the Wetland Protection Act, and also the local Brewster Wetland Protection Bylaw. And then finally we'll go over the results of our review, where we finally approved and conditioned the project. Okay. Let me jump right into this.

(Slide Presentation)

This is a site plan here. The walkway project was part of an overall project involving the reconstruct of a - there was an existing cottage that they demolished and were reconstructing with a larger year-round dwelling at the top of a coastal bank. I'm not going to talk about that, but if you look at the walkway project outlined here, you can see it goes down the coastal bank and across the coastal dune field. If you look right here, there's a large community of bearberry heath, which everyone agreed was a significant coastal plant community we wanted to avoid, and they did a good job of laying out the walkway to avoid that. They actually brought it to the east of that through some low woody vegetation, and then the elevated walkway across the dune is the lower section right here.

This is a profile of the stairway, very typical in a lot of the elevated stairway and walkway projects that we see. It's constructed of pressure treated lumber, pile supported, on concrete footings. The V-zone in this situation came, I think it's at elevation 21, comes just above the toe of

Figure 17. Dune area in Brewster, Massachusetts

the coastal bank, putting the walkway section in the coastal dune, all within the velocity zone. You'll notice there's larger velocity footings associated with that. And then there's a swing-up walkway going over a scarp down to the beach.

Here's a quick look at the walkway cross-section showing the velocity zone footings. Again, they're fairly significant. They're a minimum depth of 3 feet with a concrete pad and then a concrete block plate footing on top of that. The walkway was proposed to be elevated a minimum to two feet above grade.

The project required a variance request under our local Brewster Wetlands Protection Bylaw. And this for any work within 50 feet of a regulated resource area. The whole project, including the reconstruct of the house on the top of the coastal bank, needed it for work within a buffer, and also the walkway project itself was actually within the resource area of the coastal bank and the coastal dune.

Under our Brewster variance - under our Brewster Wetlands Protection Bylaw it says, variances are only intended to be granted in rare and unusual cases. And it lays out two criteria for a variance. The first one is a rare and unusual circumstance requirement. And this is one of those gray areas within our bylaw left to the discretion of the commission to determine what constitutes a rare and unusual case. It's also one of those areas in our bylaw that really brings out the best in creativity from consultants. We've seen some really great examples of why things should be considered for a variance.

The more important one is the no adverse impacts to the interests protected in our bylaw. For a costal dune, the interests outlined in our bylaw are storm damage protection and flood control. The Wetlands Protect Act includes wildlife habitat as an interest. For some reason, we don't have that in our bylaw, but, again, we reviewed it under the Wetlands Protection Act as well.

Performance standards are the same as the Wetlands Protection Act. They include dune erosion, the ability of the dune to erode in storm events; the dune form, ability of it to change shape due to mean water effect; dune migration, ability of it to migrate; the dune volume cannot be artificially diminished because of any project; the vegetative cover must be protected to maintain the stability of the dune; and the wildlife habitat, again, must be protected, primarily for shore-

Figure 18. Wind scour around elevated dune walkway

birds and plover-type issues.

Inward of the coastal bank on this project, here's the bearberry heath community that I talked about earlier. The walkway was being proposed along the edge of this, through this low woody vegetation. As you can see the bank is very well vegetated. And then the walkway crosses the dune field right here. This is a look across the dune field **(Figure 17)**.

There's a mound right here. Where the walkway was being sited, the dune was relatively flat in that area. And then there's about a four- or five-foot scarp going down to the beach. Again, you can see some woody vegetation along the far side of the dune.

This is a typical walkway in Brewster, and this is essentially what they were proposing. Very stand-type design, and we have a lot of these around town.

Our project review begins with evaluation of the project variance criteria, and the performance standards. If the project doesn't meet our variance criteria or the performance standards, the review goes no further. But we'll give it back to the applicants, try to give them some direction on how they may meet the variance criteria or explain to them why they can't meet the variance criteria or the performance standards.

Figure 19. At-grade dune walkway

If they do, then we'll try to look at some of the impacts around town from similar type projects. And then we'll take a look at the actual design that they're proposing and see if there's any way we can effectively look at it to - look for opportunities to minimize the impacts to this design.

And then finally, we'll review the mitigation efforts. As far as variance criteria, we always look for mitigation - proposed mitigation efforts both to mitigate for kind of a cumulative impact of these structures going within a 50-foot buffer area or the no-build zone, and also to mitigate for

direct impacts that may be associated with a particular project.

In review of this project, we first talked about the need for the controlled access or the controlled walkway. We all agreed that the unrestricted beach access is what we're trying to avoid, and this is one approach to controlling it with an elevated walkway.

Also, we came to the conclusion that we were seeing a lot of wind scour effects around a lot of the elevated permanent walkways that we have on the Brewster shoreline. Associated with this, we're seeing really some minimal vegetation under some of these raised permanent structures, especially on the seaward end of these.

And then we started talking about the walkways in general, and we have a lot of at-grade older walkways within town. And the interesting consensus of the commission was that some of these appear to be functioning as well as some of the permanent elevated structures, and sometimes even better than some of those. And that was kind of an interesting sort of discussion that we arrived at.

And then the issue of seasonal versus permanent. There are advantages to these elevated design, but they are a permanent structure in the resource area, versus some of the seasonal ones that are removed on a seasonal basis.

Again, this is a look at a path in town, an example of what can happen with unrestricted beach access. It leads to loss of vegetations, some increased wind scour, it can lead to blowouts in the dunes, really just a progressive deterioration of the dune system.

We tried to take some photos of some of the wind scour that was seen in and around some of our elevated walkways. This, for example, you can see some of the wind scouring out has exposed this whole footing, some scour around the next footing back **(Figure 18)**.

Another effect that was seen, in addition to the wind scour is this mounding effect, almost a drifting like snow around some of these structures. It's really more pronounced at the seaward end. And I think what's happening is the wind, as it scours out around the seaward end of these, is pushing the sand back further up underneath these. And if you look 10 or 15 feet back, a lot of these elevated walkways, which were originally 2 or 3 feet above grade, now the sand is mounded up directly underneath these, and it really reduces the ability for vegetation to form underneath these, which was, I think, a lot of the rationale why you do an elevated walkway.

Here's an example of some of the loss of vegetation, more wind scour around this. Looking back, again, you can see some of the mounding effect that I just talked about as well. Very little vegetation along the sides of these. More of the same, looking up the side, very little vegetation, and another exposed footing.

One of the things going on, a lot of the cause and effect of this wind scour, is a result of the orientation of our shoreline here. If you look we kind of face up to the northwest. Prevailing winds in this area for about seven months of the year, they're sustained from the northwest, and a lot of these over the winter months are sustained, high-energy winds. The walkways face directly towards the ocean and directly into this wind. It kind of creates a wind tunnel effect underneath

these, and it's causing some of these effects that I just talked about with the wind scour.

Then we looked at the at-grade walkways. This is an example of one **(Figure 19)**.

And if you look at it, it seems to be functioning fairly well. It's well vegetated along the sides of this. You can see that it conforms to the natural dune shape. It's not cut in; it's not level with the dune, but sort of sits on top of it. It's also kind of clear to me that this one's removed, if not on a seasonal basis, at least periodically. There's no evidence of the dune trying to form around it. Also, it's interesting to note, you can see some vegetation growing up through it. And even more interesting, that's where the planks are going to the east and west, unlike these ones that happen to be running north and south. I think it lets less sunlight in underneath these, and for whatever reason there is more vegetation under that when they're laid out that way.

Here's another example of an at-grade walkway. Again, you'll notice it's a much narrower structure than some of the elevated permanent structures that were seen. Also, there's a lot of vegetation around it, fairly modest impact to it.

Here's another example that I thought was really interesting. This is a larger structure, but it's at-grade. It services a condominium complex that we have in town. And it seems to be functioning fairly well. It's through an open dune area. Again, it follows the natural dune form. They didn't cut it through the dune. And really fairly minimal impact. It may be a better design incorporating it in conjunction with some part of an elevated walkway through the vegetated area. But, again, it was an interesting example of one for a commercial project that's at-grade.

This is an example of what we're trying not to accomplish with an at-grade walkway. This one you can see is cut completely level through the dune. Not seasonal. There's no evidence that this thing's ever been removed, and really impedes the natural function of this dune. You can see the dunes trying to migrate over this. We put up snow fencing to try to maintain it. You can see the evidence of the dune sand coming around.

Okay. I'm going quick here.

Another example of the same thing, impeding the ability of the dune to migrate. What we came up with, the project design, we kept the elevated walkway down the coastal bank. These seem to work well. Most of our coastal banks in Brewster are well vegetated. But the walkway section over the dune, we came up with a seasonal at-grade walkway. It's narrower in width than the original proposed design, and it's a roll-up design, designed to be rolled out, sit on top of the dune, and rolled back in the fall.

And then the seasonal walkway, elevated walkway to the beach. There's no other way to get over that scarp in a safe manner without doing that as a raised structure. But that will be removed at the end of the summer, to allow even the scarp area and that dynamic edge of the dune to function as naturally as it can without the structure being there.

And important in it, there was a three-year monitoring period that we worked out with the proponent. He allowed us to take a look at it, to see how this design functioned. We came up with a redesign agreement. If it wasn't working out, they could come back with the original elevated

design that they came up with, and they could put that in place. So we thought there was benefit to doing this.

Here's a quick look at the revised site plan, showing the at-grade section that we put in there.

Here's a quick look at the walkway design, it's a series of cedar slats tied together. Very lightweight, hopefully easy to install. Secured on this end by the elevated walkway down the bank in this way, down the elevated walkway to the coastal beach.

A quick look at the cross-section that we eliminated. Again, we also eliminated the handrails needed for the project.

The advantages of the redesign, in our minds, were it reduced the overall size of the structure actually in the resource area. We eliminated 8 permanent pilings in the dune area. Again, these were the large velocity zone footings, so less construction impact. We reduced the width of he structure from the proposed 46, which is pretty standard, to 30 inches. You don't need as wide a walkway when you're at-grade. And over the course of the 24 feet of the section, resulted in a reduction of 30 square feet in the footprint of this walkway.

Flexible design conforms to the natural dune form. Removed seasonally, so it allowed the dune form to be maintained naturally, which allowed for some vegetative recovery. Hopefully we'll reduce the wind scour effect, the three-year monitoring program that I mentioned, with the redesign agreement. And we all agreed it had less aesthetic impact. We do have an aesthetics clause in our bylaw as an interest, and if this is going to work as well, or hopefully, maybe perhaps better, there is an advantage here aesthetically.

Disadvantage of the redesign. There's no getting around it. There's some direct impact to vegetation. We sort of balanced this off with the indirect impacts to vegetation that we were seeing with some of the elevated walkways.

It's appropriate only on low-traffic seasonal footpaths. This project was a second home, used primarily during the summer months. Light use in the winter. We thought it was appropriate in this case. It wouldn't be appropriate in a - perhaps in a condominium-type setup or a neighborhood walkway. And it does require a seasonal installation and the removal, the responsibility of the homeowner, and potentially a compliance issue for the conservation commission.

Conclusions. Coastal bank and dune walkway design is definitely site specific. You've got to work with what you've got on site. Look for opportunities to identify ways to fit your design to the existing site conditions. Be flexible. Try to monitor and evaluate these projects. I think it's easy to get complacent about just, from the commission's point of view, accepting the sort of standard, accepted designs that come through, and also, perhaps from the consultant's point of view, to just approach a project that way, but try to think of ways to improve these. Once you do it, look back on them, and always be looking for ways to improve and see what works best for your area.

Thank you.

Figure 20. Saltmarsh plank walkway

Figure 21. Stub pilings used for saltmarsh walkway

Figure 22. Elevated saltmarsh walkway

MARSH WALKWAYS

Kristin Andres, Conservation Agent, Town of Chatham

MR. GATEWOOD: Our next presenter before lunch is Ms. Kristin Andres. Kristin serves as the Town of Chatham's Conservation Agent. She received her Bachelor of Science degree in Wildlife Biology from the State University of New York, College of Environmental Science and Forestry, at Syracuse. Her first introduction to coastal studies was as a field technician at University of New Hampshire's Marine Lab at the Isle of Shoals. Kristin has lived on Cape Cod for several years, and she notes that she's Chatham's very first Conservation Agent, and she's loving the position. Please join me in welcoming Kristin Andres.

MS. ANDRES: Well, I want to thank Jim O'Connell for getting me involved and getting my feet wet. This is my first year as the agent, and I'm slightly intimidated by the audience before me and your years of experience and creativity.

My talk today is on marsh walks, and also known as catwalks and plank walks, in Chatham. Again, these are structures constructed in a resource area, so the conservation commission must rely on the regulations. And if we look at the six public interests, if the

saltmarsh is significant to those interests, we must then be sure that there is no destruction of the saltmarsh and no adverse impact on the productivity of the saltmarsh with any proposed project.

I have a few slides.

In Chatham we have quite a bit of saltmarsh, and as you know we have quite a bit of coastline for a small community. This is a large saltmarsh in North Chatham. There are four walkways across the saltmarsh, only two of which have been permitted by the Commission. This is one that has not been. It's purely a plank walk, but it does gain the owners access to the beach. This has been a pre- existing walkway for this family probably for many years.

And again, here is the traditional plank walk, where the planks are laid directly on the ground on saltmarsh vegetation. Most of these walkways seem to be — it's either access to the beach, to the water, or perhaps, although we don't have this instance in Chatham, I suppose someone may just want to access their property and have a viewing platform maybe for bird-watching or just to access another corner of their property. And, as I said, this is a plank walk, nothing that's been permitted, but it's something that's traditionally been done.

And this is another plank walk **(Figure 20)**. Apparently these folks are conscious about bringing the planks up seasonally, but there's obvious adverse impact to the vegetation. The little ropes you see across, I have found out, were to keep the planks in place during high tide.

Of the few catwalks that have been permitted in the Town of Chatham by the Commission, one of them was in this area, to ameliorate an existing condition probably such as this.

And our favored design for a catwalk or an elevated walkway over a marsh are these stub pilings **(Figure 21)**. It's a one-time work activity within the saltmarsh. They remain in, and then the walkways are required to be brought up seasonally. A condition of the permit would be that the walkways could be installed or laid out on stub pilings and bolted for no more than six contiguous months, and obviously in a summer community, May to November are the chosen months.

As we look at the regulations, and protecting the productivity of the saltmarsh, the Commission's concern is the shading of the vegetation. So a typical condition or traditional conditions have been the seasonal permit and - or a permit for a seasonal catwalk. We also look at the height. The traditional height has been 2 - 2.5 feet above the marsh vegetation or above the marsh. And also spacing the planks, it's conditioned that the planks be a minimum of one half-inch space.

In addition, the Commission certainly likes to see a limited encroachment on the resource. However, in this event, obviously, they want to get to the beach, so there is no stopping them before they get there.

One of the other - as I said, access to the water. This is an applicant who came in, he wanted access to, in this case, Oyster Pond **(Figure 22)**. It is a location where ordinarily - well, there would be no way they could get a permit for a pier or dock because of the shallow waters. One of the concerns the Commission had about this - these types of catwalks to the water is that the intent is that it may not be for swimming necessarily - or actually in addition to swimming or in addition to shellfishing access, they may, indeed - the intent may be to moor a boat there. So one

of the conditions the board put on this project was that no boat could be tied to it, with the fear that if a - even a dinghy or some boat were tied to it, that it would sit at the bottom at low tides. Or if it's a motorboat, use might be - a motorboat may be put into use at higher tides and we would be looking at scouring of the bottom.

So the condition is no boat can be tied here. However, I probably don't need to tell any of the agents who are here that it's a very difficult condition to enforce or police.

In Chatham, we have the support of our zoning bylaw when it comes to structures in a resource area. Structures that you've seen here would have to receive a special permit from the Zoning Board of Appeals, and it's through our zoning bylaw that special design criteria are set forth, which address the width of the catwalks to a maximum of 36 inches. The length of the catwalk cannot go any further than the marsh vegetation. And they address, as far as the height, they made it go back to the conservation commission to decide which is — what is best environmentally for the saltmarsh.

Although we've only permitted a few of these in Chatham, I anticipate with the property, the new property owners in town and the increase in changeover in property ownership, and the increased pressure to access the wetland resources we'll be seeing more of these.

I'm very pleased to be here. We can all be creative and work together to protect our resources the best we can, and balance the need for access to our resources.

Mock Conservation Commission Hearing and Project Presentation

(AFTERNOON SESSION)

INTRODUCTION

MR. O'CONNELL: We're entering into the interactive phase of today's proceedings. This is going to be the fun part, and hopefully as educational as it is fun.

We're going to be conducting the Mock Conservation Commission Hearing, and have designed a mock project. The project is outlined in your packet, with a picture of the design of the project, as well as a verbal description of the project. The project design is up on the screen now **(FIGURE 23)**.

We have four distinguished guests to present and discuss the project today. To begin the discussion, we have Attorney Bill Henchy from the Law Offices of Bill Henchy in Orleans, and Stan Humphries from ENSR, who will be presenting the project on behalf of the applicants.

We also have Glen Wood from the law firm of Fasanella and Wood in Boston, and Leslie Fields from the Woods Hole Group here in Falmouth, who will be representing the abutters or homeowners association.

We have half an hour to present the project: 15 minutes to present the project on behalf of the applicant, and 15 minutes for the expert and the attorney to provide some additional information regarding the abutters' concerns to the project.

Following the presentation for 30 minutes, we'll separate into breakout groups. You have a color on your nametags. The color will represent the group that you will be associated with.

We're going to break into four groups. Each group is going to act as an individual conservation commission in and of itself to decide whether you're going to permit the project, deny the project, change or modify the project in some way, or condition the project. In your packet you'll see there's an evaluation sheet for the project that will allow you to record the discussions and record whether you want to deny it, approve it, or approve it with conditions.

In addition, in your deliberations, if you're not satisfied with permitting or denying of the project under the State Wetlands Protection Regulations, then you have the opportunity to suggest design recommendations that could be part of a local bylaw. So what we're looking for out of this is to review the project under the State Wetlands Protection Performance Standards. But in addition to that, if you don't think they go far enough, or they go too far, I'd like you to suggest some additional standards that could be part of a proposed local bylaw and factor that into your project.

When we report back, we will break it into two issues. One will be reporting the project approval or denial under the State Wetlands Protection Regulations, and then we'll talk about additional standards that we may think are necessary that may have to be provided under a local bylaw.

There is no opportunity for a continuance in the hearing. The applicant would like a decision today.

So regarding our breakout groups. Henry Lind will be the Chairman of the Blue Commission, and Heather McElroy of the Cape Cod Commission will be the scribe, recording everything you say.

Joe Grady, the Commission Agent from Duxbury, is going to be the chairman of the Yellow Group, with Steve Tucker of the Cape Cod Commission as the scribe.

Steve McKenna will be chairman of the Red Conservation Commission, with Bruce Tripp, the Assistant Director of the Coastal Research Center here at WHOI, as the scribe.

Kristin Andres will be chairman of the Green Conservation Commission, with Truman Henson of CZM as their scribe.

All right. I do have to emphasize one thing: this is a mock project. This is not a real project, although you will see design elements that you are familiar with or have seen on other real projects. This is basically a consolidation of many years of experience of recognizing principally gray areas relating to permitability, so it should be very interesting.

I'd like to now introduce the attorney for the applicant, and their technical expert. I guess I won't use them by name at this particular time because, again, remember it is a fictitious project. So don't associate reality with partial reality.

I'd like now to introduce Attorney Bill Henchy from the Law Offices of William Henchy who will be presenting the project on behalf of the applicants.

MOCK PROJECT PRESENTATION ON BEHALF OF THE APPLICANTS

William Henchy, Attorney, Law Offices of William Henchy, Orleans, MA
Stanley Humphries, ENSR, Sagamore Beach, MA

(Please refer to the Proposed Mock Project Figure 23 for this discussion.)

MR. HENCHY: Thank you, Jim.

Good afternoon, Mock Commissioners, I guess. Looking at this project, I think it was more intended to mock the consultants than it was the commission. I guess I'll just treat it like a conservation commission. For the record, my name is Bill Henchy; I'm an attorney with offices in Orleans.

I represent the applicants who are Mr. and Mrs. Dot Com IPO. They have under agreement this particular piece of property, which is an older, somewhat rundown section of coast here on the outer Cape.

My clients are proposing what is an admittedly ambitious project, and I'm sure some of the commissioners sitting here are somewhat concerned about its scope. I'm not going to go too far into the details. Stan Humphries, my technical expert who is with me, is more suited to go into the details of the project. I would like to address the kind of philosophy and first impressions just for a second here.

Now, we are before a conservation commission. We are not before a Board of Health or a Zoning Board. So what is relevant for the conservation commission to consider is the application under the performance standards under the Wetlands Protection Act. And I say that because it's obvious to me, looking at the project, my first impression was, boy, this is an awful lot to bite off in one fell swoop, and do you really want to go forward in this fashion.

But, you know, my clients are relatively straightforward people. They felt this is their dream project, and this is what they wanted - the way they wanted to get the property squared away. And being of considerable means, they've been very lucky in this good economy that we've had. They have the alternative of a couple of different pieces of property, but this is the one they really like, and this is the way they would like to set it up.

So we're proposing some upgrades to the property that Stan will go through in detail, but we've been very careful to propose them in a manner that complies with the performance standards under the regulations, because we know you're going to give it very close scrutiny.

It's unfortunate that we can't respond to requests for additional information - I suspect there may be some - but there is a closing scheduled on this in a week and a half, and we really need to get an Order of Conditions squared away one way or the other right away.

So having said all of that, I'd like to introduce Stan Humphries, who is with me here to my left. He'll go through the details of the project and will be available to respond to your inquiries at the breakout sessions afterwards.

Thank you very much.

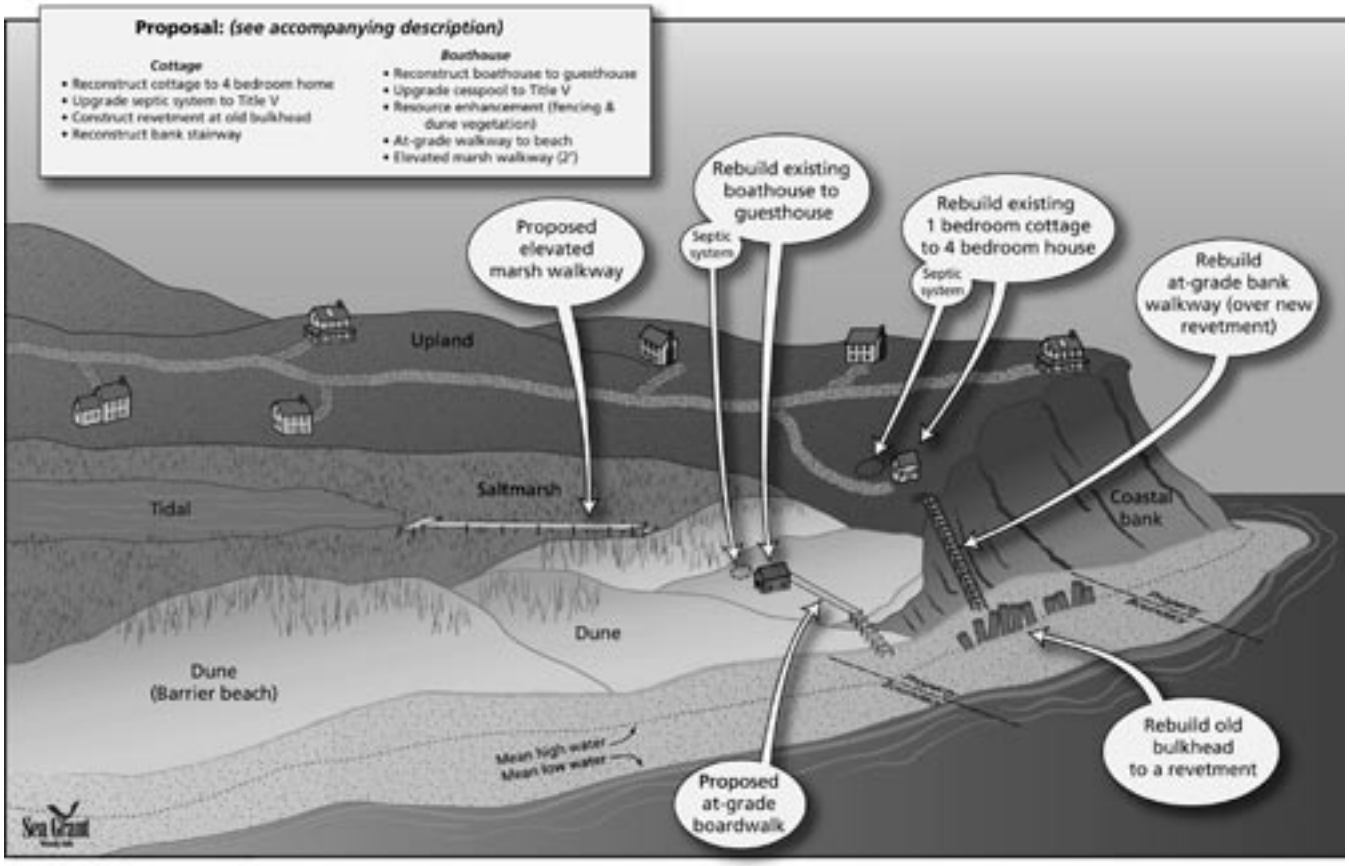

Figure 23. Diagram of the Proposed Project for the workshops' Mock Conservation Commission Hearing (designed by the workshop planning committee & presenters)

MR. HUMPHRIES: Thanks, Bill.

Good evening. For the record, my name is Stan Dune. I'm with the company of CGOC, that's C-Grant and O'Connell. I'm representing the applicant, and our team, which includes a coastal engineer, wildlife ecologist, and civil sanitary engineer.

We've prepared a 150 page document that provides the technical support for these proposed projects; their alternatives; and, their numerous mitigation measures. The commission has had this report for two weeks, and I trust you've all read it by now. Therefore, my presentation will be brief.

I'd like to describe the wetland resource areas and their boundaries, the existing structures and the proposed project.

There are four wetland resource areas on the property. I'd like to briefly go through them with you. We have a coastal beach whose boundaries are on the seaward side of mean low water, and on the landward side, the edge of the dune.

The beach is comprised primarily of pebble- and cobble-size material. Very little sand, although it's probably underneath somewhere. The coastal bank - and this beach, by the way, has been very stable over the last 100 years. The mean high water line has basically been in that same position.

The coastal bank, however, is eroding at about 2 feet per year. The glacial moraine that's composed of 90 percent pebble and cobble, and only about 10 percent is silt-size material.

The coastal dune is adjacent to it. What you don't see here is that there is a sand cover of the coastal bank as it comes down to the property line of no deeper than - or less than 1 foot in thickness.

Also, you will notice that on this portion of the coastal bank, there is sediment that's on top of the bank. It's about four feet in thickness. But we did not identify that as a resource area because it does not border on a beach. It borders on a bank.

Land subject to coastal storm flowage is the third - or excuse me - the fourth resource area. And the Velocity zone actually is elevation 16, so it comes at the front of or base of the coastal bank, and then goes landward to some point back near the saltmarsh.

The buffer zone areas are not delineated here. And the saltmarsh, of course, is on the landward side of this barrier beach and dune system that is on the seaward side. I think that pretty much defines the resource areas.

So why don't we now take a look at the existing structures in the area.

Maybe before I leave this, I should also tell you that the property boundary extended from the beach, up the bank, goes landward just past the existing cottage, and the septic system is still on the property but were bounded severely on the landward side by ownership shown as I have indicated here.

Let's take a look at the existing conditions. We've got a cottage up at the top of the coastal bank that is eroding at 2 feet per year. And it's built in 1959, and it's approximately 30 feet from the top.

The septic system is located landward of that cottage, it's about 70 feet from the top of the bank. And the grass lawn that separates the cottage has been this way, as you can see, throughout the whole site, because of the farmland use previously. There are no trees and very few shrubs.

Its dilapidated, nonfunctioning wooden bulkhead exists in the inter-tidal area. You can see the remnant piers. And the toe of the coastal bank, as I said earlier - and if I didn't, I'll repeat it again - is - has eroded to about 20 feet beyond the mean high water line there.

There's a boathouse that's down on the low area of the buffer zone to the coastal bank, and that boathouse is connected to the cottage by a footpath some 100 yards to the southeast. This boathouse was built in 1963. It's a small one-story building on a concrete block foundation. It has a cesspool, so there's been some use of this boathouse during the summertime. The boathouse sits atop the southern section of the coastal bank. The elevation of the land at the boathouse is 9 feet NGVD, relative to 16 feet for the Velocity zone in that area.

Going to the proposed project now. As Bill explained, the owner wants to upgrade the property, and we want to reconstruct this one-bedroom cottage to a four-bedroom year-round home.

Now, obviously, there will be an increase in square footage. It's approximately going to be doubled in size. We looked at the alternative of relocation. As I said, the property line bounds us

to this area, so we're going to stay within the buffer zone of the coastal bank. At 2 feet per year, we expect that this structure would be vulnerable to collapse in about 15 years if we couldn't build a revetment. Under the regulations in 10.30, Subsection 4 - or excuse me - Subsection 3, we're allowed to consider a structure, rebuilding a structure - a coastal engineering structure, that is, to protect our existing structure which was built before 1978. And in the 150 page document, you have documentation that we have considered all other means of stabilizing this bank, and it has led to this proposal for a revetment.

The revetment, I'll go into a second.

We want to upgrade this cesspool to a Title V system. And when we take a look at the structure that's proposed, I think we all want to remember that the reason we had the seaward toe consistent with the old bulkhead is because we need to get a slope revetment that's at least 1.75 on 1 and what we have proposed is 2 on 1. So it's a little bit flatter, but that flatness to the revetment will lend itself in the ability to break waves and not erode the beach as much.

To give you an idea about the design, the height of it will approximate the 100-year flood elevation. It will be sloped down to the property line. We want to take advantage of our ability to protect this house throughout the property that we own - or excuse me - that the owner has.

Going to the south side back to that low portion of the coastal bank, we will taper it up to the top, so that basically we're looking at a structure that would be in appearance something like that. I won't draw all the riprap. One- to five-ton stone, double armoring, and this has been properly designed by our engineer with filter cloth, bedding stone, and we expect this to last much longer than the timber bulkhead that was there originally.

We want to reconstruct the stairway down to the coastal bank, over the new revetment, and fronting the beach.

By the way, in summary to number one, of what we we're proposing to build, we've got, consistent with performance standards 10.27 - that's coastal beach allowing that revetment to be built - 10.30, 3, 4, 6 and 7, the function of the bank is providing sediment, but not — it is not a major continuous supply of sediment. We're looking at it more as a vertical buffer, so therefore performance standards 6 and 7 come into play, and we believe that this project will be actually beneficial to stabilizing the bank now being replaced at the bottom of the revetment, but up at the top, with vegetation and this at-grade stairway down the bank, certainly is going to not impede or destroy stability.

I'm trying to move on a little bit quicker here: we want to replace the boathouse and the guesthouse. And that, I remind you, is in the buffer zone to the coastal bank.

The reconstruction of this guesthouse is going to be less than 45 percent in substantial improvement. The owner is going to do the work himself. We've gotten the proper bids on how much this will actually cost. And we want to keep this on the existing foundation. The windows are blow-through. If we get that storm that's up to 16 feet high, we believe strongly that that structure will be able to survive these winds.

We want to upgrade the cesspool. Certainly, there should be no problem with that. It's a Title V system. The only problem that we came across was that we were too close to the water table, so we want to excavate much of that sand area in front of the house and put that back as a foundation for the septic system, so we can get the proper separation from the water table.

On the site grading, I've gone through that point. And then, in addition, along the south side of the property, we want to propose some sand fencing and vegetation to enhance the dune along that northerly edge, but we also want to be able to maintain the lawn, so we don't want that sand, you know, drifting over into the property. He said with a straight face.

We're going to need an access around the properties to these wonderful beach areas, pebble-cobble beach, so we need some boardwalks. We have an at-grade boardwalk to the beach proposed. And then landward, we want to gain access to quieter waters, and we have an elevated marsh walkway proposed that is elevated two feet above grade to allow vegetation to grow underneath that.

So with that, I'll conclude my presentation and look forward to your Orders of Conditions to approve all of these projects.

Thank you.

MOCK PROJECT PRESENTATION: NEIGHBORHOOD ASSOCIATION'S ISSUES WITH THE PROPOSAL

Leslie Fields, Woods Hole Group, Falmouth, MA
Glen Wood, Attorney, Fasanella and Wood, LLP, Boston, MA

(Please refer to the Proposed Mock Project Figure 23 for this discussion.)

MS. FIELDS: Good evening. My name is Leslie Fields, and I'm here tonight with Attorney Glen Wood representing the Neighborhood Association.

These are the homeowners up here and all around the proposed project. The homeowners in the area have a number of concerns with the project and we're here tonight to voice those to the conservation commission.

First of all, I'd like to talk about the resource areas that were delineated. We agree that work is being proposed on the coastal bank, as well as the coastal beach, saltmarsh, and land subject to coastal storm flowage areas. But we'd also argue that work is being conducted within the coastal dune area, right here, in the area of the guesthouse.

We understand that there's 4 feet of windblown material in this area that overlies glacial deposits. And using the definition of coastal dune from the Wetlands Regulations, we feel that this landform meets that definition, and that it's a hill, mound, or ridge, landward of a coastal beach and deposited by wind activity. And we would argue that it is continuous - or contiguous with this dune feature here, which is directly adjacent to the coastal beach, and therefore, we do feel that it meets the definition of coastal dune.

It also meets functions of coastal dunes specified in the Wetlands Regulations, in that it's aiding in storm damage prevention, flood control, and serving as wildlife habitat. It's aiding in storm damage prevention primarily because it is supplying sediment to nearby beaches, and you can see that by this eroding scarp right here.

As an aside, the whole feature is also located in a FEMA Velocity-zone, and is subject to wave action during storms.

I want to just briefly talk about each component of the project and bring up issues or concerns that the Neighborhood Association has.

I'll go ahead and start with the guesthouse since that's located in an area where we feel it's a coastal dune and it wasn't previously delineated as such. Because we feel that this area's a coastal dune, we don't feel that the existing proposal meets the performance standards for coastal dune. We would ask the commission to request that that guesthouse be elevated on pilings to allow the sand to - to allow that area to conform to wind and water flow patterns and to allow the sand to migrate.

We also would urge the commissioners to check with your Building Inspector, to make sure that that substantial improvement determination has been done correctly. So you might want to place it as a condition in the Order of Conditions, since you have to issue one tonight, that it

might be conditional upon the Building Inspector's checking this out again.

We also object to the Title V septic system located within the dune. We feel that that's a solid fill structure located within a dune, it's in a velocity zone, and prohibited by the Wetlands Regulations.

In addition to that, in order to install that septic system, we've heard that they will have to do a significant amount of regrading in this area. And again, that doesn't meet with performance standards for coastal dunes in that we're supposed to maintain the form and volume of the coastal dunes.

We have a lot of questions about this type of activity, such as what volume of sediment will be moved, where is that sediment coming from, what will the contours or topography look like after the project's constructed. Will there be any material required from off-site. How do they propose to maintain the minimum 1 foot cover on top of the septic system after the project has been constructed; in other words, how do they propose to monitor that and maintain that.

As far as revegetation and sand fencing, the Neighborhood Association would certainly encourage that sort of activity, although we want to see more specifics. We certainly don't want to see lawn in this area. We'd like to know what kind of dune or beach grass will be planted, what the design for the sand fencing will be, what the spacing of the planting will be: a lot of specifics like that.

Moving on to the boardwalk, in this area here. While the Neighborhood Association certainly encourages controlled access from the guesthouse down to the beach, we're not certain that this is the most environmentally sensitive design. We'd like the commission to consider requiring either an elevated boardwalk in this area, which would allow the sand to move underneath the structure, or maybe a boardwalk as proposed, but a seasonal one, as we heard Steve talk about earlier today.

UNIDENTIFIED VOICE: What's the definition of seasonal? Is it removed at the end?

MS. FIELDS: It would be removed during the winter period, when we have most of the wind-blowing activity occurring. So, October or November. It's up to the commission, but it's just a recommendation.

We'd also urge the commission to consider adding conditions in the Order of Conditions during construction of this structure. In other words, is all work going to be conducted by hand. We hope so. No heavy machinery out on the dune. To look at things like that and don't forget to condition activities like that.

As far as the marsh walkway goes, the association does not object to the general design of the marsh walkway, but we do object to the need for the structure. The association's concerned with the fact that this structure will promote boating activity at the end of the walkway, with boats pulled up, small dinghies possibly pulled up on the edge of the saltmarsh, thereby destroying the vegetation. It may also promote just foot traffic along the edge of the saltmarsh, which would also destroy vegetation.

So we'd like the commission to consider denying this portion of the project. However, if the commissioners feel that they're inclined to permit the walkway, then we would ask you to consider requiring maximum spacing between the piles to minimize impact to the saltmarsh. We'd also ask you to consider some sort of elevated walkway between the end of the saltmarsh and the guesthouse, either elevated or maybe the seasonal boardwalk, as we discussed earlier.

We'd also ask you to consider conditions for the construction of this feature, again, all work done by hand, no heavy machinery in the saltmarsh.

As far as house reconstruction goes, the Neighborhood Association doesn't object to reconstructing the cottage and rebuilding a four-bedroom house, with upland septic system, and in fact, they feel that that would be an improvement of this property.

The Association is concerned, however, that the structure is not being pulled back from the edge of the bank. Now, we understand that the applicant is proposing to armor the bank down here, but we feel with the current design of that structure, that in the future the property will still be subject to erosion, but end effect erosion, as well as erosion up here on adjacent properties, which eventually could threaten the structure. We would ask the applicant to investigate pulling the house back as far as possible on the lot and ask that the commission also require this as part of the Order of Conditions.

Our clients, the Neighborhood Association, are also concerned that surface water runoff from the lawn portion of the house is exacerbating coastal erosion across the face of the bank. We would ask that the commission require installing a vegetative buffer strip along the top of the coastal bank, which would re-divert or divert surface runoff, and thereby mitigate any sort of erosion caused by runoff. It would also enhance wildlife habitat.

As far as revetment construction goes here, the Neighborhood Association has real problems with the proposed design to construct it out here, and the reasons are as follows: We feel that this particular proposal will remove a significant portion of the coastal beach resource area, namely this area back in here. And this particular structure seaward in this location will also be subject to higher wave energies and more wave action. We would instead prefer that the structure is located more closely to the coastal bank. While we understand that the 2:1 slope is desirable, we think that in this case a little bit steeper slope, maybe 1.5:1, would be better so that we could pull the toe of the structure back towards the coastal bank.

To a lesser degree, in the long run, impacts of having the structure this far seaward, we could potentially see increased scour in front of that structure. Because it's further seaward, we'd have large waves occurring out there, and therefore, we're going to get larger waves causing more scour. We could also potentially get wave refraction, and wave focusing on the structure if it's put this far seaward. So we would prefer that the structure's a little bit steeper but pulled closer to the bank.

While we understand that the client's house was built pre-1978, and therefore has the right to consider building a revetment, we are concerned about increased erosion rates along this portion of the bank and a reduction of sediment supply downdrift. And to this end, we'd like to see

that the applicants mitigate this effect through beach nourishment. And we would ask that they design a beach nourishment project and that the commission condition a beach nourishment project. This could be done in one of two ways.

First of all, the commission could require annual beach nourishment with the volume of sediment that would have normally been eroded from that bank. Or the commission could require beach nourishment based on some sort of monitoring program of this beach, such that when the elevation of the beach reaches a certain threshold, then the beach has to be nourished with a certain volume of sediment.

I think we heard Henry talking about this earlier today, and their experiences in Eastham with that. What we would recommend is the first approach, which is to nourish annually with a set volume of sediment equal to that which would normally have been eroded from the bank.

We would also like to enter into discussions with the applicant about possibly extending the revetment and making a bigger revetment, in order to protect the adjacent abutter here who also has a pre-'78 house.

Finally, as far as the bank walkway, right here, again, the Neighborhood Association's all in favor of providing controlled access to the beach, but we feel like two walkways to the beach from this particular property is excessive. We prefer to see them using this sort of walkway in a modified design, as we discussed earlier. We feel like this walkway here, especially the portion of it that covers in front of the revetment, is exposed to higher wave energy, will have potential to get damaged more frequently, and will be a maintenance problem. We also feel that construction of the stairway across the unvegetated, bare coastal bank could pose problems along that area and enhance erosion.

If the applicants - or if the commission does prohibit this particular walkway, we'd like to see them, again, add some sort of elevated walkway from the main house to the guesthouse, either elevated, or again some sort of seasonal boardwalk in this area.

So we would ask the conservation commission to consider these issues and issue an appropriate Order of Conditions.

MR. WOOD: My name's Glen Wood. I'm with the law firm of Mindy, Mindy, and Jones, and we represent the homeowners association, of which this applicant is part.

Unfortunately, the commissions' been placed in a horrible position of being asked to close the hearing with only one public hearing process. Unfortunately, for some reason, my brother has not even approached me as of yet. This is the first time we have ever heard of it and seen it, and it places us and the conservation commission in a very difficult place. I, myself, sit on the Ipswich Conservation Commission, in reality, and obviously understand the difficulties you're faced with this evening. We, frankly, feel that based on the information submitted, although we're not adverse to large portions of the project, that there isn't sufficient information as yet to surely approve it or even to possibly move ahead with conditioning. And so - although my consultant, Ms.

Fields, has been rather kind, I'm going to be less than kind in this project.

We are not opposed to the reconstruction of the house per se. And I'll not comment on those issues, although we do surely believe it could be moved back. They don't even show lot lines on the backside on their site plans for some unknown reason. And surely, the Homeowners Association might even consider an easement, to have it moved back more appropriately.

I'm going to concentrate my comments on the area, which surely is a dune. As the Commission is aware, there has been a recent decision called the Kline decision in Truro that was decided by an Administrative Law Judge back in October of this past year. It's a leading new case on dune-bank delineation. And the key determination in that situation, was that it was determined to be a coastal bank in that instance, although originally everyone agreed it was coastal dune and then filled with about 18 feet of fill due to an old railroad line. The key issue and the key evidence was what it was functioning as presently. And surely, with 4 feet of aeolian sand and surely being in a V-zone, we believe that it's conclusively a coastal dune in this instance.

As far as a new septic system, you can't put a hard structure in a coastal dune, mounded or otherwise. The only possibility would be to actually require the hard structure, i.e., the tank, to be put up on stilts. We surely question whether this can even be a guesthouse. We're not opposed to the house on the bluff, but this is not a guesthouse, never was.

Mr. and Mrs. Dot Com are just moving into the area: they're not even the owners. They have presented no information to even suggest that it's anything but and has never been anything but a boathouse. There's no evidence in the record whatsoever in your filing as to historic use. It has one room. We don't know if anyone's ever slept in it. Surely, it has a cesspool, but that could be 50 years old and just be a 55 gallon drum in the sand.

The bottom line is that this is an abandoned structure - if it was even used residentially in the summer seasonally, it surely has been abandoned, and after 2 years under the zoning act of your town, it's not grandfathered. So this is a boathouse, and surely it would only be able to be used as a boathouse. The commission should not be setting a precedent of allowing new houses in Velocity zones.

And surely, this is not a 45 percent rebuild. That's garbage. They're doing their own work, they're playing with the numbers, as was done, as you know, historically after the No Name Storm and after Hurricane Bob. They came in with contractors who would say anything. And this isn't even with a contractor. This is the owner, supposedly Mr. Dot Com, who maybe has never had a hammer in his hand ever in his life, is coming up with these numbers. We really question that, and there's nothing in the record to suggest that they've sustained their burden as yet.

We're happy to see it continue as a boathouse, but surely not with a septic system. And when we have the next major hurricane that hasn't occurred since '38 or '54, and we're very much due for, this isn't going to even exist anymore. It's going to be totally wiped out because it's in a V-zone.

As far as the saltmarsh crossing, it sure looks like a dock to me. It's interestingly ending with a T right at — it looks like mean high water. It surely will function as a dock. We see no need for

it. We don't even know what they're using it for. If they want to walk across the marsh a couple times a year to go and get some steamers, well, fine. They don't need that. If they want to look at birds in the inter-tidal zone by scope, there's no need to do this kind of a structure in a flood-plain, in the most heavily regulated resource area that you have. My town, luckily, in Ipswich, everything is within Areas of Critical Environmental Concern, so we don't have these problems. But you do, unfortunately. Maybe you should consider the site as a District of Critical Planning Concern with the Cape Cod Commission down the road possibly. I hear there's some endangered species in the area.

And as far as the boardwalk down to the beach, surely some access should be allowed, but again, it should be very limited and only seasonal. You shouldn't have hard structures in a V-zone that are going to cause storm debris and cause potential property damage down the road.

Leslie didn't point out, but unfortunately, Mr. Humphries was a little off in designing his revetment proposal, and proposed it in and around this area here - it looks like beyond the property line. I think you need to take a close look at that. Not even to the upper end with no tie-in at the end.

Further, this is irrelevant. This is abandoned: you shouldn't even consider it. It has no legal tie-in with nature whatever. It should be along the toe of the existing coastal bank and have the appropriate tie-ins, as you're very aware, from a permitting standpoint.

Those are basic comments at this point. We don't feel like they've met the burden of any of these issues at this point. We're happy to work with the applicant, they're part of our Homeowners Association, but to date, they're putting you under a lot pressure under an alleged closing that we, again, have no information on. So with that, we would ask that you deny for lack of information. Thank you.

MR. O'CONNELL: For those of you who don't know these four, these are two real-life environmental attorneys who appear before conservation commissions on a routine basis. The two consultants, as well, are two real-life consultants, coastal processes specialists, coastal geologists who do this on a routine basis as well, and routinely appear before commissions. So what you're actually hearing is probably a summary of the many projects that they have presented to conservation commissions. So this is actually real-life experience.

I'm going to give the applicant's attorney five minutes or less to respond to the abutters' concerns, and then we're going to go into the breakout groups and decide what you want to do regarding permitting the project or not.

MR. WOOD: I also, Mr. and Mrs. Commissioners, have a handout on the Kline decision that I suggest you read and put into the record.

MR. O'CONNELL: The Kline decision is a real decision that was decided by an Administrative Law Judge just recently. The part of the discussion about the Kline decision was real, as was the Frost decision.

Attorney Henchy.

MR. HENCHY: Thank you.

MR. O'CONNELL: Five minutes or less, please. We have to move onto the next phase.

APPLICANTS ATTORNEY RESPONSE TO NEIGHBORHOOD ISSUES

William Henchy, Law Offices of William Henchy, Orleans, MA

MR. HENCHY: Well. My feelings are hurt. Not only has Mr. Wood apparently not read our 150 page submission, but he mis-cites the law and has given you the Kline decision, when, in fact, the Frost decision in Nantucket is the one that's binding on the conservation commission. I've got a copy of it here and several copies for you, and two for your town counsel.

To respond, I guess, in part, to the tone, and later to the specifics, you heard a lot about need here from Mr. Wood. He doesn't see the need, frankly, for the walkway going down the coastal bank or the need for the bird-watching platform here on the saltmarsh, or the need to reconstruct the boathouse.

Well, I would urge the commission to go back and take a look at the Wetlands Act and the Wetlands Regulations, and if anyone can find the word "need" anywhere in any of those legal documents, please point it out to me because I haven't found them. And heaven knows he's a better attorney than I. And he knows -

MR. WOOD: My hourly rate's higher.

MR. HENCHY: Because you're in Boston.

UNIDENTIFIED VOICE: The bigger they are, the harder they fall.

MR. HENCHY: He knows the word "need" is nowhere in the regulations. So the contemplation of need, although it's a human reaction, and he's pandering to your sort of visceral reaction to this project, is nowhere in the regulatory structure to which you are obligated and, in fact, sworn by your oaths of office to uphold.

So the question really is not whether we need to construct the elevated walkway out here or need to rebuild the boathouse or need this elevated walkway. The question is whether or not those structures, as proposed, meet the performance standards contained in the regulations. And although we recognize that you're being asked to bite off an awful large body of information here, we did go to the time and effort and considerable expense of having Stan Dune and his group of consultants prepare a very detail technical report. And frankly, we don't know what other information we could provide. Everything that you need to make this decision is in the record, and we do need - with all due respect, we do need a decision.

Now, on this question here of whether this area - and I'm not even calling it a resource area - whether this area here is, in fact, a resource area or not, Counsel has cited to you a decision up in Truro. But the one that really applies is 310 CMR 1.02, and I want you all to look at 1.02 when you go back to your breakout session. In order for a mounded hill to be considered a coastal dune, it must be windblown. I don't think there's any dispute that is a windblown deposit over a glacial deposit. But it also has to border on the ocean, and this area here does not border on the ocean. It borders on this coastal bank. And that's what the Frost decision over on Nantucket says. He's really given you the wrong decision, and this is an argument better appreciated by lawyers.

So rather than getting into the two decisions, I want you to look at 310 CMR 10.02, and I'll read it to you. The conservation commission has jurisdiction over any dune bordering on the ocean. It doesn't say bordering on a bank. A bank has to border on the ocean or in the estuary.

So that area right there, though it may be windblown deposits, does not meet the criteria for jurisdiction under the Wetlands Act. That's why all of the other arguments that he made about hardened structures, the septic system - which already exists, by the way, and we're upgrading it, bringing about environmental improvement - don't apply. And if you try to look at it as though it borders on this dune over here or this dune or barrier beach here, it gets to the point of where does it end? It could border on this saltmarsh back here, it could border on this tidal estuary here. The dune has to border on the ocean, and it doesn't. It borders here on the coastal bank. And that's what the Frost decision on Nantucket, which we've submitted for the record, says.

As far as the revetment and the beach nourishment that we're proposing down here - you know, I'm really surprised to hear that Mr. Wood is representing the Neighborhood Association. As he indicated, we are part of the Neighborhood Association. And the reason that this is old and dilapidated down here is because his clients' teenage children build bonfires here, and they burned down our wooden bulkhead for five years. And what's really at stake is their desire to continue to use this area, which is going to belong to us, as their private beach. That's really what this is all about. This has nothing to do with the performance standards.

We're proposing beach nourishment, we are proposing, frankly, a restoration of the resource area that will make it less susceptible to flooding and storm damage rather than what it is right now. And we believe, not only is that permittable, but it is preferable to the ongoing arson activities that are happening here on a regular basis. And if you don't believe me, check your police department records for the last four 4th of Julys, and you'll see where this has been an ongoing issue here.

So having said that, with all due respect, we do need a decision tonight. And in summary, consideration of need really isn't relevant. Consideration of whether or not we meet the performance standards is what is relevant. And the Frost decision over here, and 1.02 of the regulations deal with whether or not this area is a resource area. And we certainly believe that a gently sloping revetment is preferable to an ongoing series of bonfires in the summertime, and we ask your approval.

Thank you.

MR. O'CONNELL: Seeing the majority of the members raising their hands, we'll close the hearing now. There can be no additional information submitted. However, the attorneys and technical experts will be floating, and they can clarify information, but may not produce any additional information. What we want is all the groups to leave this room with the same information.

You will have copies of the relevant Wetland Protection Regulation performance standards in your group, as well as an overhead showing the proposed project. So if you just break out into your color group - be creative, have fun, and we'll all report back in thirty minutes.

MOCK CONSERVATION COMMISSIONS PRESENT ORDERS OF CONDITION

MR. O'CONNELL: All right let's begin. We're going to launch into the next phase, but I have a question first. How many of you want to sit on a conservation commission now?

Well, it's not over yet. Now, I think as interesting as that may have been, I think it's going to get more interesting now.

What we'd like to do now is to have the breakout group, or mock conservation commission chairs report back what the decisions of their commission were. Following that, there'll be a break. During the break, the attorneys and the technical consultants are going to caucus, based on the decisions that you made in each group, and then they're going to respond to your Orders of Conditions.

So, let's begin with the groups reporting back.

BLUE CONSERVATION COMMISSION REPORT ON PROPOSED MOCK PROJECT

Henry Lind was chairman of the Blue Group, with Heather McElroy as the scribe. Henry would you please report back what the Blue Commission decided.

MR. LIND: Thank you, Jim. Congratulations to all of our commissioners. The swearing-in ceremony will be next Tuesday. Pick up your identification pins and badge at the Town Clerk's Office.

Very focused, well-organized group.

UNIDENTIFIED VOICE: Identification tatoo now. The Boards of Health and -

MR. LIND: There you go. Tattoos would be even better. Yeah, they're life appointments, so not a problem.

Our group had major concerns with some of the resource area definitions, and we focused, for a beginning part of the discussion, on whether or not we felt that the applicant had appropriately defined some of the resource areas. And is it appropriate for other members of the group to chime in at this point, or do you want to do that later?

MR. O'CONNELL: I think in the interest of clarity, we will allow it.

MR. LIND: Primarily, we had some serious flaws with the definition of the sand that was on top of a glacial deposit not being characterized as a dune. The conclusion of the commissioners was if it looks like a dune and it acts like a dune and it sort of blows sand around like a dune, it's a dune. And that was critical to the rest of the discussion for us about how do we handle the activity that's being proposed upon that pile of sand that's being blown around and deposited in various fashions.

The second issue that we had was the coastal bank that was described to us as just a vertical buffer. It happens to erode at two feet per year, but don't worry about it, it doesn't deposit any sand anyplace, it just moves back by magic. That happens a lot in this business.

The fact that there's nothing growing on it, characterized by this lovely shade of sand color, it really tweaked the imagination of a lot of the commissioners, that perhaps this was actually contributing a good deal of sand, and, in fact, was doing its function not as a vertical buffer, but rather as a sediment source bank.

So then we started looking at the typical - the individual parts of how we go about resolving it - we started at the bottom of the hill and worked up. With regard to the guesthouse being constructed out of a former boathouse, and the fact that there was no evidence presented that said it had ever been slept in or used for anything other than perhaps cleaning fish, and that 55 gallon drum that was out back just simply took care of the gray water from the fish-cleaning exercise. It really had never been used as a dwelling. Secondly, it was clearly in the V-zone. Thirdly, it was a dune by definition of our commissioners. This was not a rubber stamp commission, however. In a vote of 12-2, an order was written denying the reconstruction of the boathouse into a guesthouse. And it was based primarily on the fact that it was misidentified as not being a dune.

The cesspool was left as a moot point. There was some discussion about whether it should be ordered to be upgraded to a Title-5. However, it was concluded by consensus that we just leave it alone, that the upgrade of the cesspool, the 55 gallon drum, into a Title-V system was probably not going to happen as a result of the fact that it could no longer be improved into a guesthouse.

Secondly, the cottage, the one bedroom to four bedrooms, was the focus of deliberations on that. The consensus - again, not a unanimous decision – 13-1 in this case, was that it could be permitted, and it would not probably broach the standards of the performance standards of the act. However, it was approved with modification that it not be located any closer to the bank than it currently exists. And secondly, that it get the approval of all of the other boards and any variances that might be required from the Board of Health, Zoning, ZBA, whatever, prior to being constructed. But in the interest of having the closing next week, that was considered to be an appropriate action.

The bulkhead at the foot of that bank, however, was denied. Again, there was discussion, and it was a 10-2 vote. Simply - not simply - the basis of the discussion was the fact that it was, in fact, not a vertical buffer, but it was a sediment source; that the construction design didn't include any

mitigation; that it was simply a straightforward Neanderthal kind of approach to revetment construction, and therefore, could not be modified by this commission in any way, shape, or form to make it more compatible with the environmental issues.

We then went from the lower area boathouse out to the marsh. Much deliberation about that. Perhaps the owners of the new cottage up top would like to walk out and watch the birds, and it was agreed by consensus - a 12-3 vote - to permit it with modifications. And those modifications would be it could not be more than 2 feet wide, it would have to be elevated 2 feet above the crown cover of whatever vegetation type was there. We weren't sure whether it was *patens* or *alternaflora*, but we modified the design so that it's at least 2 feet above whatever the grasses are going to grow to in July.

And then, additionally, there'd be some kind of an on-grade seasonal catwalk to get from where the cottages are or wherever the foot access is going to be to cross this dune/beach situation to the end of the over-the-marsh catwalk.

We did not get to discuss the site enhancement to any great extent, or the at-grade boardwalk, figuring that those are kind of moot points given the fact that it was going to stay as a boathouse and not be used by a large number of people.

So it was not a good day for the proponent, but there were very good discussions, and I thank the contributors very much.

YELLOW CONSERVATION COMMISSION REPORTS ON PROPOSED MOCK PROJECT

MR. O'CONNELL: The Yellow group was chaired by Mr. Joe Grady.

MR. GRADY: I think Henry's group was keeping an eye on what we were doing, because he came up with similar conclusions, although I think we had a much larger number of people.

We went about it in much the same way as Henry's group. We first decided that we should look at the resource areas and whether or not we agreed with the applicant. And we didn't. We came to the conclusion that the dune extended up over the top of the coastal bank, where the flood zone is, up beyond the cottage.

We then wrestled with the coastal bank. We agreed that it is a coastal bank, and we determined that - just the same as Henry's group - that it was an eroding coastal bank, it was providing sediment downstream, and that was quite an issue.

We tried to talk a little bit about the cottage. We got hung up a lot on the cottage and whether or not it was being expanded, whether it was being renovated, whether there was an issue going between one bedroom and four bedrooms. We did agree that it was built before 1978. That's about it.

UNIDENTIFIED VOICE: That was a 12-3 vote, right?

MR. GRADY: We never even got to a vote on any of these items.

Because of the fact that it was being renovated, to what extent we weren't sure of, there was

conflicting information in what was provided. It seemed to reflect on whether or not a revetment could be constructed. But we did agree, again, because the revetment was in an eroding area providing sediment downstream, that the design, as proposed, wasn't proper, and because the applicant was in a rush to close on this and was not willing to come in with a redesign, we were not willing to redesign it for him, and we denied it.

We felt that there were problems also with possible erosion on either side of the proposed structure. We were not going to allow it to be built out to the old remnant wooden structure. It needed to be back at the toe of the bank.

So we went back to the cottage again, and we tried to decide whether or not we were going to allow them to rebuild it, replace it, or something along those lines. We ended up denying it for lack of information. We weren't sure what they were proposing to do, and there was no Board of Health permit, so the Title V (septic system regulations) issues were of concern to this group.

We then tackled the boathouse, and because of the fact that we did agree that it's all — it was coastal dune, we denied it because the full foundation was proposed to remain underneath the structure. They felt it needed to be on an elevated pile-type foundation, and as a result, we didn't even bother really discussing too much about the septic system. We're just going to deny the boathouse reconstruction.

Again, I think the group, in all of these instances, was willing to reconsider information if the hearing had been left open; but because of the fact that nothing else could be presented, their hands were tied, and in every case, they needed more information or a redesign to be able to permit the project to go forward.

The site enhancement, we just lightly touched on. It was clear that they weren't going to allow a lawn in a dune area.

The boardwalk at-grade, same type of thing. We just sort of touched on it a bit. The feelings were that if the applicant was willing to keep the hearing open, we probably would have permitted one boardwalk to serve both of the structures, rather than two, one over the coastal bank and one over dune areas.

Again, our hands are tied when the applicant wants to close the hearing and not provide anything else.

The saltmarsh catwalk, it was the same type of thing. There was no proof that there was an existing use, existing path that was causing problems that needed the boardwalk. There was some feeling that it was too low, and again, that we needed more information. So all the way across the board, we denied all of these applications. Sorry.

UNIDENTIFIED VOICE: They can reapply though, right?

MR. GRADY: Yes.

RED CONSERVATION COMMISSION REPORTS ON PROPOSED MOCK PROJECT

MR. O'CONNELL: Red group. The Red group was chaired by Steve McKenna.

MR. McKENNA: Well, we took a little different look at the project. In fact, overall, we really liked it.

We agreed with Mr. and Mrs. Dot Com to rent out the boathouse for two weeks next August.

We spent a lot of our time deliberating actually on the reconstruct of the cottage at the top. That took the better part of our discussion. It included a couple of motions to deny it outright. That didn't carry. Eventually there was a motion made to approve it with modifications, and that was with a significant setback, actually pulling it back to 50 feet from the top of the coastal bank.

All the roof and water runoffs have to be diverted to the landward side of it. They had to create a 25 foot vegetated buffer along the top of the coastal bank, and the work limit line was the edge of that 25 foot buffer.

And it was subject to revised plans and Board of Health approval for the Title 5 septic system, they were going to have to relocate probably as a result of pulling that back. So it was finally approved with those modifications, if those are acceptable.

The bulkhead component of that proposal was denied, and the motion carried. The rationale was that there was no threat demonstrated that the property on the top of the bank was threatened, and therefore, they didn't demonstrate a clear need for it. The coastal bank was clearly a significant sediment source. The design that they proposed, as Henry pointed out, was pretty Neanderthal and had a lot of end effects associated with the design and other problems. And they didn't conduct an alternatives analysis for that, the 150 page document, was unclear or was comprehensive enough, but I'm sure it cost a lot of money.

The boathouse part of the project was approved with the following conditions: They had to keep the same footprint, elevate it to 16 feet above - out of the V-zone; no lawn area was to be permitted; and it had to meet coastal dune performance standards.

It was clear when we talked about the resource it was in, it was the feeling of the commission that it was clearly a dune area. The cesspool part of that, the boathouse project, it was approved with modification, that that be moved out of the dune area. And the suggestion came as a forced main up to a combined septic system in the upland area behind the house. And so with those conditions, the commission agreed to approve the project subject to these conditions.

And one of the notes was that there was a need for V-Zone bylaws as a result of this project.

The at-grade boardwalk was approved, and that generated some interesting discussion as well. It came close to being approved as an at-grade seasonally removed walkway from the boathouse area, with the condition that there only be one access. So that required them to remove the existing walkway over the coastal bank if they wanted this access from the boathouse.

And it almost carried as a seasonal walkway, and then, because the issue came up that it was a year-round house, and that it was thought that it was going to be used heavily used on a year-round basis, that changed to a motion to approve a permanent at-grade walkway, which carried.

And the other part of that, they wanted an at-grade permanent walkway connecting the boathouse to the house at the top of the bank. So that part of the project was approved with those conditions.

The saltmarsh catwalk, that was denied in about thirty seconds because we ran out of time.

That's as far as we got. Thanks.

GREEN CONSERVATION COMMISSION REPORTS ON PROPOSED MOCK PROJECT

MR. O'CONNELL: Last, but not least, the Green Team was led by Kristin Andres.

UNIDENTIFIED VOICE: Go green.

MS. ANDRES: I think we were pretty - what's the word - we weren't very tough on the applicants. Hearing the rest of the boards, I think you did a very good job in your denials.

We did approve the cottage being replaced with a four-bedroom home, provided that it - any additional expansion would be landward and not seaward. We wanted to see submission of an approved septic plan. We'd like to see the applicant establish a buffer zone that's perhaps bermed and revegetated with indigenous species, so that it would mitigate any kind of runoff from the existing lawn area over the eroding bank.

Any machinery or materials or access would not be done on the seaward side, it would all be done from the landward side. And we also addressed roof runoff to drywells. And that is perhaps why we got kind of hung up on the cottage there and the septic system.

One of the issues that came out is that, someone suggested that a bylaw recommendation be that the local bylaw not recognize the pre-1978 grandfathering protection clause in the state regulations, because it was noted that all of these houses along here are pre-'78, and at some point, we're looking at a coastal bank that's going to be armored in the future.

We looked at the bulkhead, and with some modifications, felt that it could be permitted. We wanted to see the returns pulled back at least 10 feet from the property line to the right, at the return end, 10 feet within the property line; and on the left, we wanted to see the return 10 feet to the right of the dune.

UNIDENTIFIED VOICE: We also relocated it to the toe of the slope.

MS. ANDRES: To the toe of the slope, yes. And it was pushed back to the toe of the bank slope, and not where the applicant had proposed at the existing bulkhead but in closer. I'm not sure what we decided on a slope. Oh, I know. We decided that the slope of the revetment would match the existing of the coastal bank. And we would require a nourishment plan. There was talk about different nourishment plans, and we sort of agreed on the erosion rate times the height times the length of the revetment would equal the potential sediment that has been eroding from that bank.

The reconstruction of the bank walkway, we really didn't have a consensus on that. There was

talk about having the walkway maybe built into the existing revetment, and doing some heavy revegetation along that bank. I think we wanted to do the revegetation but weren't quite sure about that walkway, so we really didn't take action on that.

The boathouse, the finding was for the commission that, indeed, the resource area is a dune, and because of the 4 feet of sediment and because it's in a V-zone, we did deny this because of lack of information. They wanted to use the existing foundation, and being that it's in a V-zone, actually the board would suggest to the applicant that they just flat out withdraw this part of their application. And so therefore, we didn't address the cesspool there either.

Site enhancement, we denied that for lack of information. There was concern that it might be a wildlife habitat and there was no information provided that that inventory had been done and just for lack of details as to what the site enhancement was going to involve. And we figured they didn't need anything since they weren't going to get the boathouse.

The at-grade boardwalk was denied. Again, the board felt there wasn't enough information, that there might be other alternatives to this boardwalk, and that perhaps it wasn't located in the best place. We'd like to see alternatives.

The saltmarsh catwalk was approved with modifications. We thought the T should be taken off at the end so it didn't look so much like a dock. And also to address any cumulative effects, no reason for that T, let's reduce the square footage covering the saltmarsh vegetation. A maximum of 30 inches wide and 2.5 feet high was the preferred height. It should be seasonal, and the wood should not be creosoted, the work would be done from hand from the land out, and storage of the seasonal walkway could be on the upland.

UNIDENTIFIED VOICE: Stub piles.

MS. ANDRES: And stub piles, yes. Stub piles.

The overall rating we gave on this project - it was difficult. It was a lot to deal with, and having a limited amount of information, we got bogged down sometimes, but with only one hearing, it proved a challenge. We gave this a rating of 1.5.

MR. O'CONNELL: Positive or -

MS. ANDRES: Negative, negative.

MR. O'CONNELL: This is reality, believe it or not.

What I'd like to do now is to take a short break. If the chairs of the groups and the scribes, as well as the technical consultants and the two attorneys could stay here just for a few minutes while we caucus a bit. Then we'll be returning to the attorneys' response to your orders of conditions, then an open discussion. Thank you.

MR. O'CONNELL: We're going to now have the response by the applicant's attorney, as well as the adjacent property owners' attorney as to the various Orders of Conditions and what their opinions are on them and whether they support them.

Following their presentations, we're going to have an open discussion, to discuss all the issues we previously covered, but anything else that we may have been left out. That will be an opportunity to voice any issue.

Again, just a reminder, please state your name clearly, and speak clearly and loudly, so we can get your comments on record.

I'm going to allow one comment from the Assistant Director of the Rinehart Coastal Research Center and one of the scribes, Bruce Tripp.

MR. TRIPP: Bruce Tripp, Woods Hole Oceanographic Institution.

Before we get really annoyed at the lawyers and their picky comments, I'd like to say thank you to the lawyers and the engineers who made that presentation. I was delighted by the presentation. Everything was so perfect, it's obvious that all of those details have been practiced and have been thought about very thoroughly, and they made the workshop run, as far as I'm concerned.

MR. O'CONNELL: Attorney Bill Henchy, attorney for the applicant.

MR. HENCHY: Thanks, Jim.

I want you guys to know, I don't know how I got picked to present this project. I mean, those of you know me usually see me shooting things down -

UNIDENTIFIED VOICE: Good to see you on the other side.

MR. HENCHY: I guess I have a couple of observations. I sat in on some of the group discussion rooms, and I kept some notes. We deliberately made this project a difficult one for the proponent with a number of gray areas in it.

There are a couple of general observations I want to make. I don't want to nitpick about what your decisions were.

The first thing I would say is, let me put on my hat as if I were now representing a conservation commission rather than a project proponent, because that's really where I'm most comfortable. For those of you who don't know me, I sat on the Brewster Conservation Commission for, oh, 9 or 10 years off and on, and was the chairman for much of that time.

One of the things that we deliberately did to make it uncomfortable and difficult for the commissioners was that we were not agreeing to a continuance of the hearing. And you know, 8 times out of 10, if not more, that's going to be a bluff. I mean, a piece of property that's under agreement that is of this magnitude, isn't going to change hands without the permits being in place. So, I would not, as a commission, feel particularly intimidated by that. But I do think in your deliberations, in my judgment at least, you made some mistakes.

I'm not surprised at the rate of denials. It is a project that is begging for it in a couple of respects. But one thing that I do think is a mistake is this coastal dune delineation. This is somewhat new in the development of the adjudicatory proceedings up in Boston (at the MA Department of Environmental Protection (DEP)), but there actually is a case, although this fact pattern's a little funny because of the dune on the side here. But if you have a dune that only borders on the bank, and it doesn't border on the beach or the ocean, you really have a situation where even though it meets all the other criteria and even functions as a dune, as counterintuitive as that is to all of our experience, it may not be a dune under s.1.02 of the Wetlands Protection regulations, where you may not, therefore, have jurisdiction.

Now, in this case, you could argue that the entire dune system is contiguous all the way around and borders on the ocean here, and therefore it's properly considered to be a dune. And I hope some of you picked up on that. Certainly Glen made that point during his presentation. That's one to watch out for because it's going to come up from time to time, particularly where you have a lot at stake and consultants who are aware of this sort of new development.

Picking it apart one by one, despite my plea for not considering the *need*, it was obvious that some of you did. In my view, I wasn't just sort of being an advocate there. I really think that the consideration of *need* or why an applicant wants to do a particular thing is really beyond your purview. It just is not anywhere in the wetlands act or the regulations, and I think that's deliberate because that's such a subjective judgment.

What the purpose of the statute and the regulations is is to protect the public interest of flood control, storm damage prevention, prevention of pollution, protection of wildlife habitat, and so on, that wetland systems serve to protect; and whether or not an applicant needs to do a particular thing is not relevant to whether a project meets those criteria.

So on the subject of the bird-watching platform here that looks like a dock, a lot of you chose to deny that one. There were a couple of denials for lack of information — let me say something about denials for lack of information, because I heard a lot of it in the discussions.

If you've got a technical report of 150 pages, even if you've got an applicant that isn't going to continue to allow you to digest it or to discuss it further at the hearings, I think if you do a denial for lack of information in the face of that kind of information, you're setting yourself up to be tipped on an appeal by the department. You know, the regulations say that if there's a denial for lack of information, the department's review is limited to considering whether or not the commission had the requisite information upon which to make the decision.

I think you can assume that when a lawyer and some consultant like Stan Dune out there with 150 page report, that they've considered all of the aspects of the regulations and the fact pattern that you've got, and somewhere in that report is going to be information upon which the Board could make a decision. You may not agree with it, you may think it's wrong, but to simply say the information isn't there, in my judgment, is a mistake for a conservation commission to make.

The much savvier determination, I think, is to do what some of you did in the case of both the

revetment and in the case of the boathouse here, which is to say we don't agree with the delineation of the resource area. And, because this whole thing is contiguous, despite the wrinkle in the regulation here, you've got a good basis for saying that. And when you say to an applicant, we're denying you because your delineation of the resource area is inaccurate, then when it goes up for appeal at DEP, you've got a real claim as to whether or not the delineation of the resource area is accurate, rather than the question of, did we have enough information. The DEP will very likely shoot it right back to you and say, yes, you did. You should act on this one way or the other.

So I think that's the more appropriate way. If you're intending to deny something because you don't like it, you think it's inaccurate, you think it's too much, tie your denial to something that relates to the performance standards in the regulations or to the information that was presented that you may disagree about.

The coastal bank is a sediment source is another example that jumps out. Dr. Dune further said it was simply a vertical buffer. Well, you know, we know from looking at it that it's more than a vertical buffer. And based upon the information presented, the commission can certainly say that.

I was surprised - maybe I'm out of touch, but I was surprised with the various denials of the revetment - we were just talking about that — up here.

This is a house that was built pre-1978. There was a statement by one of the commissions that there was no proof of - no threat to the property on the top of the bank is what I had in my notes. Well, this is going to be gone in 15 years on the outside, and that's an average rate of erosion. We all know that storm events don't occur on a steady-state basis. I mean, this could be - one particular storm could easily wipe out 10 or 15 feet of that 30 feet of bank that's left. I think that that is a basis for denial which is begging to be overturned.

Maybe some of the folks - I don't want to put anybody from DEP on the spot, and I won't do it. But my experience is that -

UNIDENTIFIED VOICE: Oh, go ahead.

MR. HENCHY: They're not on the agenda. They're here to listen, I guess.

My experience is when you've got a pre-'78 house, provided you design a revetment to the best available management practices, it's going to get an approval, as long as it's on a coastal bank and not on a coastal dune.

Now, one can argue here about whether or not putting it out this far is best management practices. You certainly can argue about whether this part of it here, which is arguably on the coastal dune, should have been approved. My own sense of this revetment part of it would have been that the smart move for a commission to do would be to condition it rather than to simply outright deny it because I think it's a denial that would be tipped over on appeal.

Now, having said that, Glen and I were talking about this philosophy of do you redesign. Well, this is what the applicant proposed. You know, how are we going to tell them what they should build, whether it should be back against the toe or what have you. I really think that in a situa-

tion like this, where you have a property that's changing hands, somebody plainly wants to buy it, and they want that permit in place, if you think that that revetment should be back against the toe of the bank, I think you say so rather just simply deny it.

As far as the upgrade here, I think some of the conditions on that were appropriate, that all of the conditions be placed landward rather than seaward. I think most of you came to sort of the right answer on that in my view.

This part here we had a lot of fun designing because we knew this would be particularly problematic for everybody (conversion of the boathouse to a cottage). But I think that — I mean, you can either look at it two ways. You can say nope, denied, because you've got habitable space within the V-zone, or you can say approved with conditions. And I think if you're going to deny it, again, I would add, if I were running the thing, that we disagree with the delineation. We believe this is a dune. Lay out the reasons why so that your denial is both on the substance and on the delineation issue, which is always a good basis for argument. The department (DEP) takes those issues very, very seriously.

You know, if you raise in good faith, with some legitimate information, the delineation issue, everything sort of stops right there because a prerequisite to application of the performance standards and approval or denial of the project is what resource area we're working with and where is it. So if you really do have a question about a delineation issue, I think you want to raise it early and raise it forcefully.

Other than that, I want to thank all of you for your time and attention. I'll be happy to answer any questions, Jim?

MR. O'CONNELL: Glen Wood, Attorney Representing the Neighbor Association in the mock hearing, would like to address some issues relating to the deliberations leading to the orders of conditions. Glen?

MR. WOOD: I'll just go over a few things that Bill said. Obviously, Stan and he had an uphill battle. I think much just because of the need to close the hearing in one night, which obviously surely isn't the norm; and the fact patterns that were vague to some extent, brief as needed, I think, to try to digest as much as one could in this presentation; and also, you know, we're largely leaning towards denial for lack of information or modifications and things like that.

I agree with a lot of what Bill says, and I guess I disagree on certain things. I think that to some extent there is a need for a commission from an alternative's analysis review to actually understand what the purpose of a project is. And that although need, quote - unquote, is not a term or a noun that you would find in the regulations, I think that surely when you look at minimizing impacts, you need to, therefore, look at alternatives, surely limited projects at a minimum in the regulations allow you to look at minimization of impacts and alternative analysis.

And for the marsh walkway, for instance - if I could get permits for my clients for these things all the time, life would be easy. I mean, I just don't see a lot of conservation commissions that I'm in front of weekly approving that. But, you know, we'll see. Maybe commissions feel that that's

okay. But here you have a new property owner coming in, hasn't stated why they need it, what they need it for. Does that mean you're setting a precedent, that the other homeowners and maybe one undeveloped lot that's sitting in the middle is going to have three more? If you approve one, you've got to approve three more. Maybe you should think about a community proposal for one.

You know, I just think that any concept of approving that, I think, is a very poor decision by whoever voted to approve it today. I think it's denied on its face, in a millisecond my commission would. You know, I didn't see how you could approve it. And it's also discretionary. It says catwalks may be allowed. It doesn't say shall. You know, there's a big verb difference there.

So I think that you've got to show why someone needs it. And surely with the T at the end of the walkway as proposed, it surely suggests that they're just not going to go out there with a pitcher of gin and tonics. I mean there's a tie-up issue there. I mean, at least in the fact pattern I see.

Another point is that I think that there is value in denying for lack of information as long as it is specific as to what you denied it on, because based on the regulations, if DEP concurs, they automatically, without any discretion whatsoever, are required to remand it back down to you. So there is clout with that. I don't disagree you should also consider denying it, as Bill pointed out, for substantive grounds, but I don't have a problem whatsoever, and I would strongly suggest denying for lack of information if a proponent chooses to not give you any level of information. Surely, you can digest whatever girth of submittal you get and pick through it within your twenty-one day period, issue the order, subsequent to the close of the public hearing, and find what they haven't provided. It's just - the bottom line is someone - your agent or someone has to spend the time to write a strong Order of Conditions.

My conservation commission that I sit on, we rarely deny a project. We work with people. We maybe deny a couple a year. That's because we continue it, we work with them, we get it done because we want to hold control over it and not send it up to Wilmington (to state DEP) for them to look at it rather quickly and largely always approve it. And I know there's a lot of frustration with that at the local level. So control your own destiny. I mean, they've got a lot of work themselves, and if it's in the ballpark of permittability, it's going to be permitted largely with less special conditions than you would ever, you know, expect to see in it.

So I think that there is value in that. I don't see it often used, but when it does, and if I'm opposing a project and I see that, I jump all over it. I mean, it's somewhat easy pickings then because DEP's hands are tied behind their back under the regulations.

Further, I'm entirely uncomfortable, and I think it's bad policy, and I think it's a violation of open meeting law arguably to approve a project like a revetment that clearly is unpermittable as proposed. I think it's on a beach. You can't have a revetment on a beach. It's not allowed. You can have it up against the bank, but you can't have it on the beach. So they've proposed an utterly unpermittable project. It's denied.

You can't design it for them. Further, you surely can't say we'll approve it. Come back in with a revised plan for a completely different project with different returns, different slopes, different

impacts, upgradient, offgradient, offsite. It's a violation of open meeting law, in my view, because you've not allowed the public to review a substantially revised project. So I think that to do that is not sensible and/or legal.

I'm not as concerned about the house because it's a buffer zone. Surely, if you're proposing building the house landward of the resource area and building it back, that's maybe something you could live with because the impacts aren't substantial. I mean, there's no impacts either side. I think that there's certain things - Surely, I mean we accept things and have a proponent come in with a retweaked replication plan after the hearing's closed. But you have to be careful, and especially, too, because most towns do have bylaws. And it is on the administrative record, on appeal to Superior Court moving into reality, that you want to build a strong administrative record, or a commission wants to build a strong administrative - or Bill or myself, whatever way we're facing. Because realistically, the fight on a nasty case isn't going to be within DEP most of the time. It's going to be in Superior Court, or in a few towns, at least here on the Cape like Orleans, or Yarmouth, they go into District Court, through that bizarre little path to District Court. It's generally on the record. That means no trial, no expert witnesses, no discovery.

Bill and myself stand up there, say hello to a judge, motion practice, we get 10 minutes each. Maybe we get a view if he wants - he or she wants to come out and see the property. That's it. A year down the road clients look at you and go, this is justice? That's certiorari. You know, we should be wearing a wig and being in England. I mean, it's just from old English law.

It's a horrible process — in my case, so much of the time, I get involved after the fact, after the administrative record's been generated, largely poorly, on whatever side I'm on.

But, you know, I don't think the commission needs to be afraid to make a hard decision or to stand up for what's right. Like we wrote a silly denial on a project a few years ago. It was a buffer zone project, and we said, oh, it's going to be - the house is going to be within 50 feet of the wetland. The commission denied it, and I sort of went along with it. But I said, I'm not writing the denial. And our agent, our former agent, wrote a little - piddley little denial, and they went in court, and we got blasted by the judge. I mean, if you're going to deny something, deny it, and spend the hours that it takes to write a good denial. Many conservation commissions write good denials.

So I think that understanding those procedural processes are as important as understanding of the technical and substantive regulatory parameters that you face and understanding the real world process that follows from the action that you take and the track that it will take. If it's denied, are you going to really play a role? If it goes to an adjudicatory hearing process, conservation commissions fade away. Is this going to trigger a DRI review? For a bigger project, we're going to have the benefit of the Cape Cod Commission coming in with technical support.

I'm not going to really react to the decisions one way or the other. I think it's a tough call on a lot of these, and I think a broad brush is based on the facts and the lack of facts, which have led to many of the varying decisions here.

So those are my generalized comments.

Thank you.

MR. O'CONNELL: That was wonderful. I think what I'll suggest at this point is to combine two things. One, the open discussion, and two, let's take advantage of the talent in this room, as well as two well-seasoned environmental attorneys here. So, if you have any questions now following up on these issues, or any other issues that were not addressed, let's float them amongst ourselves and let's ask the experts. I suggest that we just open it up at this point

Jane?

MS. HARRIS: Jane Harris of Chatham.

I'd just like to go back one minute to the subjectivity question of this morning, simply because there was one thing that wasn't addressed.

The group of 15 people, it was very interesting for all of you who were not there, that really when you look at the ratings that were given, both in the direction and magnitude, there was very little variation. I think that attests to the fact that it wasn't as subjective as some of you may have thought this morning, in the fact that the direction wasn't negative or positive on a general type of project. Even within the direction and magnitude, whether it was minus 1.5 or -2, in almost all cases, those projects came out pretty much the same.

MR. O'CONNELL: You were relating to the landform sustainability project?

MS. HARRIS: Yes, to go back to that question this morning on the subjectivity of the results. I think it was less subjective than perhaps some thought.

MR. O'CONNELL: Thank you.

Les?

MR. SMITH: I have a question. There was a lot of discussion about the coastal engineering structure and whether it should be denied or approved with conditions. When looking at the regulations, they speak to the best available measures. And one of the best available measures is potentially moving the house back. Moving the house back is one potential measure, yet there seemed to be some problem with denying the house improvements at its existing location without requiring them to move it back. So there's kind of a dilemma there. There was no problem denying the revetment for lack of looking at alternatives, but there seemed to be some reluctance to deny the house reconstruction at a more setback location. I'd just like some input, what your thoughts are on that, on those three issues.

MR. HENCHY: I think I understood the question to be comment one, the feasibility of moving the house as best management practice.

MR. SMITH: Yes.

MR. HENCHY: Why approve the house or deny the house when you haven't dealt with the revetment. Les, is that basically it?

MR. SMITH: That's correct.

MR. HENCHY: Okay. Well, a little bit of real world. Nobody in their right mind would come in with a proposal to upgrade the house and do the revetment at the same time. You would want to do the revetment first, proposing to protect the existing house, and then deal with your changes secondly because it's more approvable that way.

MR. SMITH: You mean in this case?

MR. HENCHY: Right.

I don't know. I think to say that one of the best management practices, in terms of construction of a revetment or a structure on a coastal bank - which is what the regulations speak of - is moving the house, is quite a stretch of the regulation. I mean the regulation pertains to structures on a coastal bank. I just don't agree that a commission has the ability, by fear as opposed to by agreement of the applicant, to require a house to be moved as a condition of approving a revetment.

I really do believe that you've got to take the regulations as they exist and apply them. It really can be tough. I recognize that. Because if it's obvious to you that a clear solution to this is to move the house, but the applicant says no, I think you are stuck with simply applying the regulations at that point in time.

On the question of whether or not to approve the changes to the house or not, I think similarly those stand on their own, and as Glen pointed out earlier, really that's a buffer zone case. As long as you're not adversely affecting the stability of the coastal bank by your work up there on top, I think you can approve the changes to the house, consistent with all other local and town regulations.

Which brings to mind a solution to some of this. You know, the wetlands regulations and even a lot of town bylaws are somewhat inadequate to the task of dealing with these issues that come up, and we're seeing more and more of them as the value of coastal property becomes the value of the property itself and not the structures. People buy them just for the land so that they can then go about these kinds of renovations. So that really the right way to address a lot of these things is not to try to shoehorn them into the wetlands regulations, but to work with the Planning Boards and the Boards of Health and to develop local bylaws, maybe even non-zoning bylaws. Call it a coastal structure reconstruction bylaw or some darn thing that addresses some of these issues in a more comprehensive way rather than trying to make a round peg fit in a square hole under the wetland regulations.

MR. O'CONNELL: I have two quick follow-ups to that.

One, in the landform sustainability project, 99 percent of the projects that were in the buffer zone, I would guess there probably were 100 or so projects that were proposed in the buffer zone, and about one third of those were in the buffer zone to a bank, were all rated having no impact. So, in other words, the reconstruction of that house, being in the buffer zone to the bank, under the sustainability project all of them were rated of having no impact.

The second follow-up is, and it's also a question, in the regulations it states, as far as propos-

ing a revetment that may be permitted to protect a pre-'78 home, or pre-August of 1978, doesn't the language in the regulation say if there is no feasible alternative to provide that protection, and therefore, isn't relocating the structure a feasible alternative? I guess I'd open that up to anybody who knows of a precedent case that may address that.

Let me read the specific language, or do you have it?

MR. HENCHY: Section 30.3B. The applicant demonstrates no method of protecting the building other than the proposed engineering structure is feasible. My question is the word "demonstrate." Should the applicant demonstrate physically that two years ago he planted vegetation and it didn't work? Last year, he moved the house, and it's still eroding, it didn't work. Our 150 page document that goes through a paper exercise of saying, well, we don't have enough money, and the vegetation really doesn't work, it's not salt tolerant — that's a major question I've had over the last couple of years.

MR. WOOD: Well, we had to do it.

I mean, Les, you've had to do it out on Nantucket. I've had to do it on Nantucket. I've had to do it other places. I've had to do it with conservation commissions. I've had to do it with DEP. We've had to move houses back under this provision initially, or show that it's not feasible to move a house back.

I've had a case where a client of mine had to move a house back onto another house lot that he had adjacent to it, one that he used and one that was a rental property. He put the second house — for the first house, which is now under water, onto the second lot, the second lot and the second house was not pre-'78, but the first house, which was moved back, was pre-'78.

So do you then get to do a revetment on the second lot because there's a pre-'78 house on that lot that was moved from another lot? The answer of DEP was yes, if you show that there are no other feasible alternatives in terms of site, altering it, and/or softer engineering. But I mean, DEP, in all honesty, has taken — has pushed my clients to show that there are no other alternatives. Conservation commissions surely have required my clients to show that there aren't soft or semi-soft alternatives.

I mean, one possibility, arguably, would have been for the commission to show that there aren't soft or semi-soft alternatives here first instead of a hard structure first. I mean, some conservation commissions would require that.

So, I think, Les, you are correct. We know you know it from some of the things you've done, that you have to look at alternatives and look at options. I think the Commissions have some local jurisdiction in that area.

UNIDENTIFIED VOICE: Are there court decisions on that?

MR. WOOD: Court decisions?

UNIDENTIFIED VOICE: Yeah, regarding barrier setbacks.

MR. WOOD: We also know, too, that the emergency provisions - I mean Lakeville takes the position - and correct me if I'm wrong, that there isn't an emergency for hard structuring, un-

less a structure's within, what, 50 feet of an eroding coastal bank? Your question is, when does an emergency occur after a storm that you're even allowed some temporary hard structuring, like hard sandbags and things like that, before you get to the next step of what is the long-term solution to, in the interim, protect the house. Surely, they would want to first see that you can't move the house back further.

Then question two - the other question is how long do you let the erosion continue, if it's at an annual 2 foot rate, before you allow the hard structure to occur? I mean, would a conservation commission say you can only do soft solutions until the existing structure is in jeopardy - even when you're not even going to upgrade it. The existing structure is within X number of feet of the eroding coastal bank. Look at Manomet in Plymouth, with houses that now are condemned because of erosion - and if you walked on the backyard of a house, literally you could die because it could slump immediately. Stan knows that. We've worked on some. And then there are some pretty spooky situations. I mean, ultimately, these places are going to be uninhabitable - steep slopes like Manomet - there's nothing you can do. Live with it until you can and then move.

MR. O'CONNELL: One of the cases in the Cedarville area of Plymouth where the house is 30 feet from the edge of the bank recently did get a permit to put a gabion revetment in. The others have not come in for armoring.

MR. WOOD: Yeah, which, you know, is a short-term solution, really.

MR. O'CONNELL: There's two issues I think I just heard. Number one, the emergency provisions. If there's a storm, like after the October '91 storm or the December '92 storm, the emergency provisions, in my experience, allowed temporary sandbags and other measures such as that while the applicant decided what they wanted to do in the long-term, whether to relocate the house, design the revetment, or whatever it may be, but they were putting in sandbags, allowed as a temporary measure on the coastal banks.

MR. HENCHY: Jim, the only thing I was going to say as a follow-up, taking a slightly different view of the regulation, is that, you focus on this word "feasible." What does feasible mean? It's not defined. I'm not aware, that isn't to say that there aren't, but I'm not aware of any adjudicatory decisions that deal with that. But is it feasible physically if you throw unlimited funds at it? Can you stem the tide of the erosion such that it's not necessary to put a hard structure there? Is it feasible from a financial point of view? Is it feasible physically? Must you put your house in a situation where you're in violation of the zoning laws, and, therefore, you need a variance? Is it feasible legally?

I think that - and I really do think, and I may be in the minority on this one, but that there is another reality which is the role of the justices of the Superior Court. And if you exercise - and when I say you, I mean conservation commissions or other departments, frankly - exercise your discretion over the word "feasible" in a way that just gets sort of out of step, or becomes arbitrary, or it puts a homeowner in an impossible situation, there are ways to trump the administrative process and get into court and get a decision from a judge directly. I think that this is an area

where good judgment and the careful balancing of the public and private interests will keep a commission out of trouble.

And I think, my own view - it may be a minority view - is that if you know a revetment is going to be inevitable in a given location, and ultimately permittable, deal with it.

MS. MONTOURIS: Bill, I don't agree with that. I think that -

MS. MONTOURIS: Oh, yeah. Dorothy Montouris, DEP. But I'm only speaking for me, not DEP.

I think we have an obligation to look at the most benign method of trying to stem that sort of thing. And to just assume a hard solution will ultimately get you there, I don't - and so automatically permit it when there may be better alternatives in terms of environmental impact. I think that's the responsible way to go. And I don't like the idea of even waiving of the Superior Court saber because I don't think, quite frankly, there's any real evidence to support that. I think if you — the commissions are well within their rights to make that kind of determination as to what the best solution is, and so long as it's not arbitrary and capricious, I don't think trying to evaluate - trying to seek a better environmental solution is going to put you in that position.

So I get concerned about that because I see folks on the conservation commission level react to that. Oh, we're going to be sued for takings and all that. I simply don't think -

MR. HENCHY: Well, that's a different - that's a bluff.

MS. MONTOURIS: Well, but essentially, that's where you're going with that.

MR. HENCHY: No.

MS. MONTOURIS: Well, in terms of - well, arbitrary and capricious, or if you're not allowing somebody to take their houses, is it ultimately a taking? I mean, I think, hypothetically, we would worry that we should take that step.

But also getting back to the comment you made about if you have a 150y page document, you probably have information. I don't know think that's necessarily true. Both in science and law, you can get paper, and the fact is there's not, in many instances, the substantive stuff is not there, but it looks impressive, so let's assume it's there. So long as you identify the information that's missing and one needed, you're on safe footing. So, that's another thing I don't think people should be deceptive into rationalizing, well, gee, if it looks impressive, then you shouldn't do the analysis. So I think it's necessary.

MR. HENCHY: Two responses. On the latter point, I didn't mean to give that impression. If you've got a piece of paper this thick, just go ahead and approve it. But Glen's comments about the administrative record, and particularly after. You know if you're headed into a controversial case, and you're representing an applicant, you and your consultants are going to cover in that document virtually everything that you need to cover, everything that you could think of, and you're going to run it by a couple of people just to be sure that there isn't anything that you've missed, because in the Superior Court, it's just like Glen described. If you don't have it in the record somewhere, you're not going to get a chance, in most cases, to submit it. So you're very careful to get that in ahead of time.

So probably the right advice is what Glen suggested, namely to use your twenty-one day period to assess whether the information is there. I just think a denial for lack of information when you've got an applicant that's plainly loaded for bear, is a tactical mistake. It doesn't say — mean you shouldn't do it.

MS. MONTOURIS: So long as it's supported by what the regulations required, which is identifying why it's needed. You're assuming that if you deny it, that you're not meeting those. There are other instances when there are plain-out denials, and they don't do that, and yes, that is sent back, but so long as you meet those requirements, you're okay.

MR. HENCHY: In my case, there wouldn't be a single resource area and performance standard that wasn't addressed in that 150 page document, not one. We would go regulation by regulation. I mean then we're now evolving into two lawyers quibbling about text on a particular case, which isn't principally helpful to you all.

On the revetment issue, I guess you've got sort of both sides of the philosophical point of view. I just think that your ability to regulate depends, to a large extent, upon the good judgment which you exercise when you engage in that practice. And I mean, I'm not some shrinking violet when I'm sitting on a conservation commission. You know, I'm just saying that when you get to the boundaries of where you can get yourself in trouble, that you be very careful in the exercise of your discretion; and if you're going to exercise it in a way adverse to the property owner, be very careful that you articulate why you're doing it, and tie it to the purposes of the legislation, so that if you really need to, you can make it stick. Because otherwise, you could find yourself out there alone, and with some judge with literally 10 or 15 minutes worth of review of what you've done, he's got a bad gut reaction to it, and tosses it out.

MR. LYTTLE: David Lyttle from Ryder and Wilcox.

I do agree with Bill. I don't think a conservation commission should necessarily take a defeatist attitude, if they see this and take a defeatist attitude and necessarily approve it because they realize they're going to have to sooner or later, but take an intelligent look at the situation and analyze it, what's best for the commission, what's best for the client. I think Bill's comments on this were right on point.

MR. O'CONNELL: Bruce?

MR. TRIPP: I have a question, maybe a point of information from the lawyers, but the lack of threat came from our commission, and I perhaps offended that with a performance standard that I invented on the spot. That house is 30 feet back, and it's eroding at an average of 2 feet per year. Presuming you can get through the regulatory process in about a year and a half, and you get through the construction phase in another year and a half, you've got about 3 years to get that revetment approved and built. And they've got 15 years of house life left on the lot with the average rate of erosion. So I didn't see that there was a threat that led immediately to a hard solution in this particular application. So the no threat came from it isn't going to happen within the length of time that these homeowners could come back and ask for that at some other point in time in the future.

MR. WOOD: But the reality is that on the other side of it - if I was for the proponent and assuming there's no ability to move the house back, I would argue that there is no feasible alternative because 2 + 2 + 2 is 6, minus 30, is 22. And on a steep bluff like this with that erosion rate, soft solutions in a V-zone aren't going to work. They're not going to work. You need a hard structure. That's the real world.

If you're going to protect that lot, soft solutions just aren't going to work.

So the question is, in the balancing of life, are we going to protect the private lot and allow hard structure, or basically allow a lot in the not too distant future to not be a habitable lot?

So although I hear what you're saying, I would, frankly, if I was proponent's counsel, argue that if you can't move the house back, this is a revetment proposal, and I would be surprised with a house that's 30 feet away that this would not most definitely be a positive superceding order of conditions for a revetment, properly designed.

MR. TRIPP: And actually in approving the house, we did move it back.

MR. WOOD: Yeah.

UNIDENTIFIED VOICE: There's just a quick follow-up. Remember those are average rates. You could get that in one season with a couple of bad storms.

MR. WOOD: Right. It depends on the cyclic nature. I mean, for instance in certain places, if you've got 10 years on average, but then you get cycles depending on longshore drift and where you have a shoal offshore, like on the south shore of Nantucket, literally, you can have one house here with wave attack that's severe, and five houses down, it isn't, just based on one winter cycle, depending on where the shoaling is and just utter luck of the draw. But with that kind of erosion rate of ten plus feet a year on the south shore, it's inconceivable that there's a soft solution in a V-zone that's ever going to protect these properties.

MR. O'CONNELL: I'm going to make one quick comment before I call on people. I'm not necessarily supportive of going to the hard solutions immediately either. I've always wanted to see some alternative analysis of relocating or some nonstructural solutions. But I do know this. I'm just finishing up a statistical analysis of shoreline change data and an update of the shoreline change data now for the entire shoreline of Massachusetts. We have noted sites that the long-term average shoreline change rate is zero, and in one case on the southeast corner of Nantucket, they're showing a mild accretion rate. But if you look at the fluctuations and the short-term time frames to arrive at that long-term rate, it's eroding and accreting in 200 foot cycles. And one of the beaches actually eroded 200 feet in 10 months. I'm not talking about bluffs in this particular location, this is the high-water line. But again, long-term shoreline change rates need to be analyzed very, very closely, and scrutinized to look at what is really happening - is it continuously eroding or alternating in cycles.

So my message is, don't look at the long-term average shoreline change rate without looking at the internal, short-term fluctuations that are taking place to arrive at that long-term rate.

MR. WILBER: I think that in today's exercise we've seen that the present as it has evolved from

the regulations, and unfortunately, the future, and that is that the lawyers get rich talking to these people while nothing really effective happens in terms of preservation of the whole coastal system. I do not think, as I mentioned this morning, that it's at all surprising that under the criteria that you circulated that conservation commission decisions failed to protect the sustainability of whole coastal systems.

Therefore, I think that we've talked here about that changing the regulations, perhaps introducing some sort of real evaluation of whole coastal systems into this parceling out in terms of minutia at any one spot. Sure, you can make some sort of a compromise under the existing regulations on a piece-by-piece basis up and down this coastline, and what you're going to end up with then is the same thing you'd end up with if you just decide to block it all off tomorrow. I mean, it's ineffective. I think we're seeing now that as well meaning as these wetlands regulations are, they're really ineffective in getting at the sustainable coastal systems idea.

I think one of the real, real problems of this, and I'm sure we all acknowledge this, is that grand-fathering guts the intent of this. I mean, your working with your arm and two legs tied behind your back in these cases. It's very frustrating to see the amount of time and money and the efforts poured into this in what's fundamentally a stacked deck because of grand-fathering.

So my suggestion would be to take real action toward the phasing out of grand-fathering clauses in these regulations. I think then you would start to see some effectiveness in the existing regulations for the whole system consideration.

And the other suggestion I have to make is you talked about changing local bylaws, strengthening local bylaws. This doesn't matter in a place like Cape Cod. Local bylaws are almost locked in stone now. Any even small effort to change a bylaw in terms of a stronger regulatory action or to take back a little bit of property rights is just crushed. It's just crushed.

So my suggestion is more and more you have to think about ways to transcend the bylaws, you have to come up with solutions that work outside of the temple of the bylaws and regulations: Grass roots environmental economic efforts that take these properties when they become available, just buy them outright and put them into a manageable situation. Prioritize the acquisition of properties on the Cape, just like the 300 Committee has done in the Town of Falmouth.

It just seems to me that you come to an impasse under the existing regulations, and if you're going nowhere, you're going to go nowhere.

MR. O'CONNELL: One quick response. The technical experts who provided the recommendations for performance standard for the wetlands protection regulations did not propose a grandfathering clause. It was added in later on the state level. So what you're suggesting is that it is very difficult to pass - eliminate the grand-fathering clause - on the local level as well.

Keep in mind that the state standards are considered minimum standards, as are the federal standards. I would suggest that it may be easier on the local level to take that next step to be more stringent, if you have the will of the people in that community, because to find the will of the people on a statewide basis is probably a lot more difficult.

UNIDENTIFIED VOICE: I don't think it's any easier at a Town Meeting.

MR. O'CONNELL: We can continue on this track, but what I'd like to discuss, as Jude Wilber just asked, is: where do we need to go from here. What other policies might we suggest that could lead to regulatory changes? Where are the holes in the performance standards? What type of research do we need to be able to move to the next level? Are we there already? I'd like to know, what are the research needs, number one, and what are the policy changes we need, or we can continue this real-life discussion. We still have half an hour on schedule, so there's still plenty of time.

I'd like to call on a couple of people who haven't spoken. JoAnn, your hand's been up a long time.

MS. MURAMOTO: JoAnn Muramoto, Horsley and Witten.

I think one thing that really jumps out here in this exercise is the fact that permitting is on a site-by-site basis, and because it is site-by-site, it doesn't address the coastal system. If we were asked instead to look at this whole project in a coastal context, perhaps that's the way to deal with this one. I suspect it is. Where are the coastal resources that cross this line of water? We don't know what those are. And, in fact, that's often weighed when the conservation commission reviews the project, and often in isolation from other adjacent coastal resources.

And so I think that one of the things that would really help conservation commissions to assess the effect of its permits is to understand the larger coastal context for their community. And I think that that calls for development of a very specific inventory of coastal resources and coastal projects to help the local conservation commissions understand that their permitting decision, say for this site, might affect property which is five blocks away and not included in this particular decision making.

So I think that the regional context of a permit has to be made clear to the conservation commissions, but they also need to be provided with the data to backup their decisions.

MR. O'CONNELL: You can correct me if I'm wrong. I'll give you a chance to respond. But I think commissions have that ability now under the existing performance standards.

MS. MURAMOTO: They do, but because review of the site of the project is always on a site-by-site, or a lot-by-lot of basis, theoretically, they could think about the project across the way, but in practice, they rarely do. They almost never do.

MR. O'CONNELL: So, knowing the performance standards, it's suggesting to me that we need to do a better job on educating commissioners and the public of the broader context. Because if you look at the standards for coastal banks, it's supplying material to down-drift beaches, barrier beaches, and dunes. So that I think there's the ability to consider a larger reach than just that property at hand. Whether that's happening in reality, then maybe the technical people need to do a better job in educating commissioners and the general public.

MS. MURAMOTO: I believe the coastal regulations in the preamble do list resource areas fairly well. I think that way that conservation commissions have often been trained to review projects is on a resource area by resource area basis, lot-by-lot basis, and it tends to really departmentalize the decision-making process, and in so doing, we focus on little issues rather the big picture.

MR. O'CONNELL: So maybe a question that we can implant in all the conservation commissions is there's an ability to hire a technical consultant at the applicant's expense, if they pass a bylaw in their community, to address the question, what are any off-site ramifications of armoring a bank, for example.

MR. LANCASTER: Bob Lancaster, Barnstable Conservation Commission.

I'd like to change the subject a little bit, if I could, and go back. I have a question for Glen about the walkway across the saltmarsh. I think you said that that was something that most commissions and you personally would deny, but you didn't really explain what the grounds for that denial would be. I wonder if you could -

MR. WOOD: Well, I meant in the context of this setting, building it out further. You know that your conservation commission doesn't like docks. Okay? There's just a couple in court, as with other conservation commissions. So any structure over a saltmarsh for purposes of getting access to the water in many towns seems to be taboo. I would think that in my work on docks, and I do a lot of dock permitting, they want to look at why you need it, are there alternatives, is there a community option, a homeowners association?

I understand the concept of access to water, and the property owner's vision of that. And assuming it's just for getting one's kayak out there, the question is, does that one specific need that's ten times a year merit even a seasonal structure of this magnitude.

Now, that combined with somebody who wants to go at low tide and get quahogs to make clam casino, another four times. I mean, we have projects where say I've got an existing dock, but there's no walkway out - the dock really starts at mean low water, and there's a walkway through the marsh. And the first walkway's gotten so mucky, that they made a second walkway because it's so mucky. And in that case, surely having a walkway over it to serve a purpose makes sense, but I could see surely if this was permitted, I'm just thinking about the bigger implications. If you allow this structure, then you're suggesting that anybody who has any vague basis for watching sunset, having a canoe, a kayak, having a private shellfisherman's license can have one of these things, and you're going to get the proliferation. The concept of a generic EIR for Jehu Pond with dock projects for instance, and the concept of aesthetics. You know, the concept, as you're aware of in some of the decisions, in your ability to regulate docks from a navigational standpoint.

So I think that there, on certain levels, are concepts of need, minimization, and alternatives.

This is a tough one. I mean, I personally never dealt with the walkway issue. I have in my Conservation Commission where we're going from an island to an island to an island that was used historically to run rum in Ipswich actually in pre-Colonial time.

But I hear what you're saying, and I know I was vague on it, but I mean, I'm just thinking it through myself, and personally I'm a little uncomfortable. I can understand the concept of a dock.

MR. LANCASTER: See, this is the problem we're having. We've gone from docks, which you know, we've got our own standards.

MR. WOOD: Yeah.

MR. LANCASTER: But now we're starting to see walkways only for the sake of walkways.

MR. WOOD: Purportedly.

MR. LANCASTER: And we're talking about walkways that are 200-300 yards long. These are -

MR. WOOD: I have them in Ipswich.

MR. LANCASTER: - long, long docks.

MR. WOOD: You know, they're whole historic things that go like this all, way out across the marsh. But they've been there for literally 100 years, so they're quote, unquote, grand-fathered. But yeah, I mean, it's an interesting question. Surely it adds a value to a piece of property. It's another little trophy.

MR. LANCASTER: I was hoping you could offer some kind of advice, but I guess not. I mean if these things meet performance standards, we're sort of stuck with these, so it would appear right now.

MR. WOOD: I don't know. Is the point that a family is going to traipse across a long marsh, not even to get - as you saw in the photos - to get access to a beach but just to get access to a tidal area for some vague and/or unstated purpose? Does that justify the project?

See, I'm of the view - and I guess I disagree with Bill - that if it meets the performance standard, you can approve it. I don't agree with that. I think you've got to show why you're going to use a structure. Obviously, a dock's a dock, it's going to have a boat. It's an interesting one. I'm not really particularly up on it. I've never been asked to permit one per se.

MR. WOOD: I think it's the next, if you will, evolution of docks to this kind of a thing. I think they're troubling.

MR. O'CONNELL: But, in my opinion, you've got to stick with the adverse impact standard. Need and value are not standards under the Wetlands Protection Regulations. There was a conference held here a couple of months ago on the impacts of piers and docks. Steve?

MR. BLIVEN: Steve Bliven, from UMASS Boston. To address specifically the docks, piers, and walkways things, we've been employed by DEP to try to put together some guidelines for conservation commissions in the permitting for consultants and the design and so forth of docks and piers.

So there is some of that coming together. Hopefully, it will be of use to you.

If I can then switch to another thing. Both what Glen said and what JoAnn said, there seems to be a strong desire to go from this resource area by resource area or lot by lot to a broader evaluation. I suspect Bill or Glen would argue over whether you could do that within the -

MR. WOOD: No.

MR. HENCHY: No.

MR. BLIVEN: - confines of the Wetlands Protection Act, but it sounds like there's a real desire to get from a very narrow focus to what you've already focused on. And I'm wondering if there's a way I can do that either within the confines of the Wetlands Protection Act as was vaguely hinted at, or whether there's some other mechanism of research that would put together some form of criteria that could be used to evaluate these things, so it can be done once rather than every time a parcel comes up for proposal, some other mechanism of that nature.

MR. O'CONNELL: One comment on your guidelines. I hope that the guidelines are going to be backed by documented science. Because if they're not, then the guidelines aren't going to stand up in a court of law, I would suggest. Guidelines won't be a problem. We have guidelines now for piers and docks, and easements - 4 feet above the marsh, a certain length, certain plank spacings, and commission decisions are still being overturned. So I'm hoping that there's some scientific basis that could show under certain conditions, orientation, elevation, spacing, that there are or are not adverse impacts on the specific resources; or once it gets out of the department's hands and goes into Superior Court, I'm not sure it will stand up unless you can actually document there is an adverse impact.

So I'm hoping that there will be some scientific backup behind it.

MR. BLIVEN: Given that theology is the queen of all sciences, we're planning to use divine revelation. In the case where things aren't revealed to us, the best available science is what's going to be used as a basis for these guidelines. The difficulty, as many of you know, is that there isn't best available science for a lot of the aspects. Part of the workshop on docks and piers talked about shading impacts, and frankly, that's very vague. There isn't a lot of good science on that.

So, it'll be the best available science which is the best you can present to the court, in order to try and uphold decisions. That sort of leaves it to the appellant to say I have better science than you, but hopefully in the best of all worlds, we'll have a little better record.

MR. O'CONNELL: That's a dangerous path to follow, and we know that from out on Cape Pogue Pond on Marthas Vineyard. One consultant happened to have a lot of time and a lot of money to go out there and scuba dive and actually look at the resource areas. The department had one person out there who didn't have the time and the scuba equipment to go out and actually do that, therefore, the testimony on one side was heavily weighted. If you documented that you went on the site, scuba dived, saw the eel grass beds or didn't see the eel grass beds, despite what the conservancy map showed, and the other side didn't, that's a convincing piece of evidence. So it's a very dangerous path to follow.

I think that perhaps I would suggest that before you come up with the guidelines, there has to be some field research necessary. I attended that pier and dock workshop and the science of the impacts, or lack of, is very weak, if not almost totally lacking. There's a little bit, but I don't think there's enough, so I'm hoping perhaps there has to be a scientific component to it.

MR. BLIVEN: We're getting some, not up here, but specifically, there isn't the money to do the field research as a prologue for these sorts of guidelines. So what we have to do is work with what's out there. We can set up a contribution box on the way out should any of you care to contribute to that.

So we're taking the available science and working with that. That's going to grow both for research projects and for permitting projects. One can very strongly argue that the case that you're talking about, the Jacquet case out on the Vineyard, that, in fact, better science was produced by the applicant than was produced by the people who didn't want to see the project. And conse-

quently, the Administrative Law Judge (ALJ) said yes, we agree with the people who came in with the better science. Intuitively, you may disagree with the issue, but what was presented in the record was much stronger, according to the ALJ, than the applicant.

MR. HENCHY: Jim, I wanted to just follow up and I think this dovetails nicely. There was a comment made and I think Steve said it, maybe Glen and I would disagree about whether or not you could do some of these things, and I don't think there's any disagreement about that. My own view of these regulatory problems, because at the end of the day, despite the desire to do a better job, to regionalize this stuff, to make substantive progress, this stuff works on the site-by-site, commission-by-commission level. That's the way the legislature set it up and intended it.

So that as things stand now, for example, on the subject of these catwalks over the salt-marshes, they're going to be very troubling for you because the way the regulations are now, the relevant standard is will this destroy or impair any portion of the saltmarsh or the marsh productivity, and if the thing can be designed so that the answer is no. Whether you like it or not, that's what the law allows.

This is where I do think Glen and I disagree a little bit. If your problem is I don't like these things, I know they're a Trojan horse for a dock either now or by amendment someday going down the road. And what's more, if you see one of these on every site, the cumulative impacts are certainly going to impact these saltmarshes.

Even if on a site-by-site basis we can't measure or articulate how, say what you mean, go through the process of developing a regulation at your local level. You all have the power to do it under your local bylaws. Go through the process of discussing it in an open and fair way, do your best and develop a consensus, if you can, and then go forward, so that applicants and property owners will know what's expected of them.

In my view, it's unfair to take a regulation that says one thing, and because we don't like what it says, apply it in a completely different manner, and that's just the - perhaps a philosophical point of view, but it also suggests to you that that's the way most judges and, frankly, most administrative law judges, I think as well, who are reviewing these decisions will look at them when they're done. As opposed to a regulation that says, you know, we've done a study of our tidal estuaries, and we believe that in estuary X, there is a proliferation of docks and piers, which we believe will adversely affect the public values identified in the wetlands act, or in our own bylaw or aesthetics if we want to make it a zoning or an historical district issue, go through the process of determining what those impacts ought to be and an appropriate way of regulating them, and then do it. I think that's the way you achieve the sustainable coast - the equilibrium going down the road if you don't like the present system.

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The primary objective of this publication is to share with a wider audience the valuable information and extensive dialogue that took place amongst over 140 individuals who attended the second in a series of planned workshops on the science and management of coastal landforms in Massachusetts. This workshop took place at the Woods Hole Oceanographic Institution on January 24, 2001. The individuals who attended this workshop are actively engaged in planning, managing, regulating, engineering, educating, and studying coastal landforms and their beneficial functions. This workshop titled, Can Humans & Coastal Landforms Co-exist?', was a natural follow-up to a previous workshop, Coastal Landform Management in Massachusetts, held at WHOI October 9-10, 1997 (proceedings published as WHOI Technical Report #WHOI-98-16).

The workshop had a very practical, applied focus, providing state-of-the-art scientific understanding of coastal landform function, case history management and regulation of human activities proposed on coastal landforms, a multi-faceted mock conservation commission hearing presented by practicing technical consultants and attorneys that involved all attendees acting as regulators in breakout sessions, and, at the conclusion of the workshop, an open discussion on all issues related to the science and management of coastal landforms, including future research needs.

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